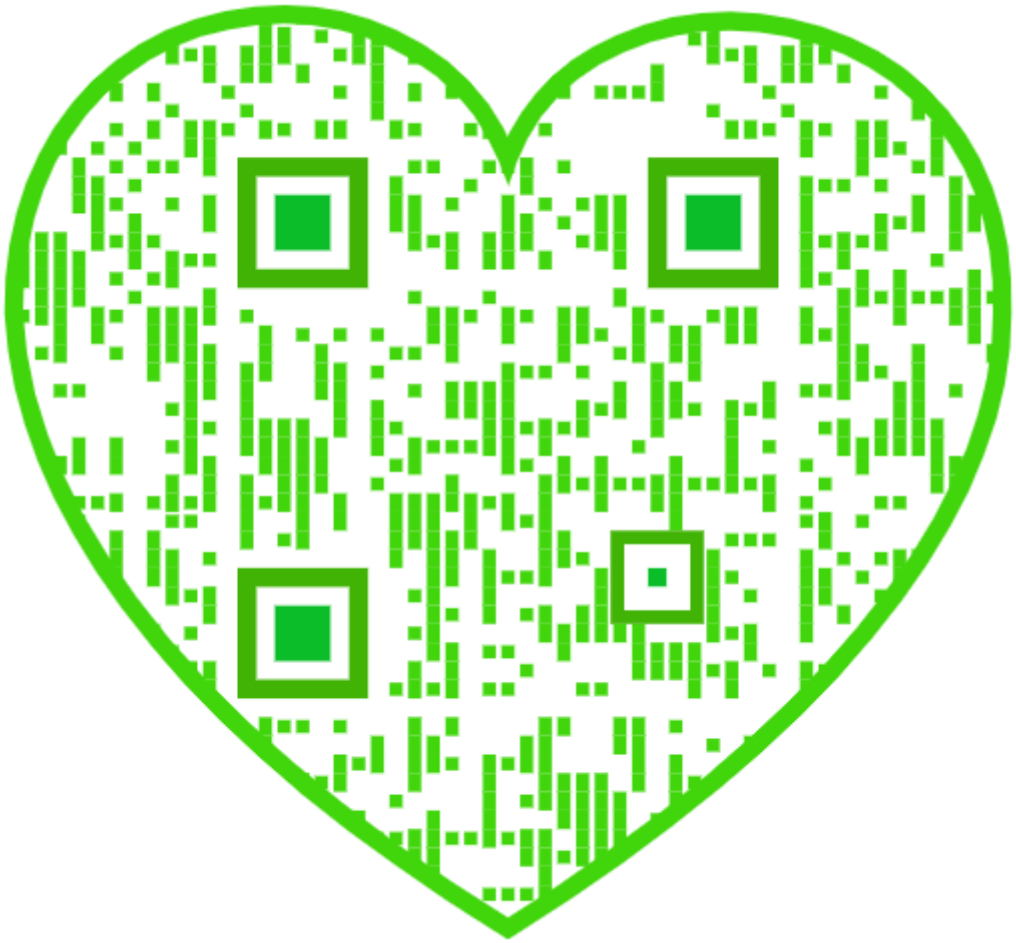

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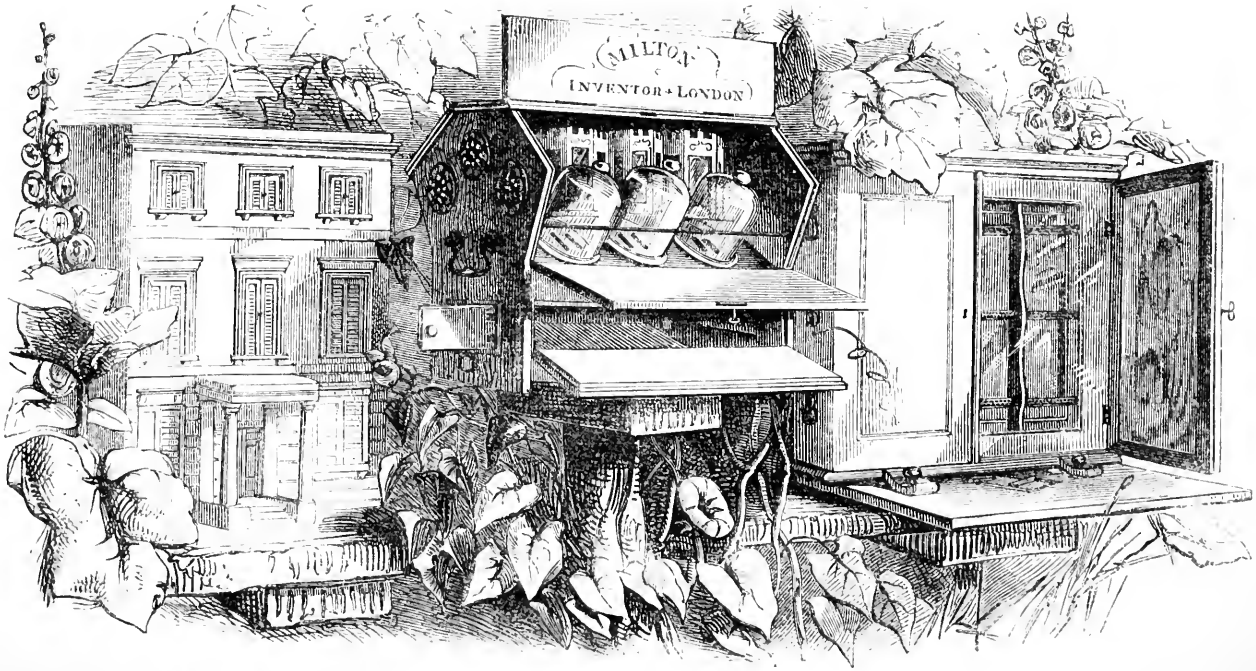

The Mansion of Industry.
See page 21.

The Royal Alfred.
See page 45.

The Unicomb Hive.
See page 62.

THE

PRACTICAL BEE-KEEPER;

OR,

CONCISE AND PLAIN INSTRUCTIONS

FOR THE

MANAGEMENT OF BEES AND HIVES.

BY JOHN MILTON.

"In summer's day, the fragrant hay
Most sweetly scents the breeze,
And all is still, save murm'ring rill,
Or sound of humming bees."

DICKENS.

A New Edition,

WITH A FRONTISPIECE OF BEES AND HIVES AS EXHIBITED BY THE AUTHOR IN THE CRYSTAL PALACE.

LONDON:

JOHN MILTON, APIARIAN, GREAT MARYLEBONE STREET.

MDCCCLI.

1851

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PREFACE.

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IN the present new edition of Instructions for the Management of Bees and Hives, I have added descriptions of several new and improved hives, as well as various hints and suggestions, the result of careful experience; and although the work is condensed (and consequently cheaper), it contains more information, and, I trust, will prove worthy the attention of every one who studies the habits of bees. But I am desirous to offer some apology for a second time coming before the reading public. It shall be this, that having so grand and beautiful a building as the "Crystal Palace," in which will be seen some of the best and choicest productions from every quarter of the globe, I was induced to once again bring my little insect-friends into notice; and if, after reading these pages, I shall have conduced to procure for them kinder and better treatment, as well as assisted the bee-keeper out of

any difficulties he may have to combat with, I shall feel that my endeavours are repaid. I am sure that all who study this interesting branch of natural history will find their sentiments have become refined, and they will be led to exclaim, "The skill of the workman is commonly seen in that which is of little size."

JOHN MILTON.

London,
May 1*st*, 1851.

INTRODUCTION.

THE following pages contain a few concise and plain instructions for the management of bees and beehives. My object has been to explain, with clearness, the easiest and most useful methods of bee-keeping ; in the hope of promoting a general improvement in the systems of cultivating and preserving these valuable and interesting insects.

This simple work makes no pretension to the merit of new discoveries : nor do I assume to communicate anything unknown before to the scientific or professed naturalist ; but to those, who, having a limited knowledge of the subject, are desirous of further information, I trust it is in my power to impart many facts and hints—the result of a long and patient pursuit of the culture of the bee—which will materially aid them in attaining their object. Errors of omission and oversight will no doubt be found in a work prepared, as this has been, during short intervals of leisure,

snatched from the bustle of business ; but I trust they are but few and trivial, and will not materially interfere with its usefulness to any one who may refer to it for information.

The various natures of our soil and pastures, the profusion of our woods and copses, the humidity of our climate, united with the general warmth of our autumn, —all combine to increase the risk of bees doing well in England, and are serious impediments to their culture upon a large scale ; yet, perhaps it may, with some confidence, be suggested, that any one who is so circumstanced as to be able to afford the time, who has the means of obtaining the necessary supply, and who will bestow on them a patient and careful examination, will find both pleasure and gratification in the study, and it is very questionable whether any portion of the animal creation is capable of returning to man a greater profit, in comparison with his outlay, than bees.

Of all the curiosities in natural history, the labour of bees is one of those that causes the greatest admiration. There can be no doubt that at a very early period of the world, man would naturally be led to notice and appreciate that insect which secured to him one of the best of his simple luxuries, and, consequently, he would very soon avail himself of its labours. I am not, however, aware of any "bee-keeper" previous to Aristomachus, who, it is

said, studied bees during sixty years. Philliscus retired into a desert wood, that he might have an opportunity of observing them to better advantage. Aristotle made a great number of curious observations on this insect, which Virgil refers to.

These observations were enlarged and confirmed by Pliny and others. Theophrastus wrote upon the bee. Columella, the celebrated Roman agriculturist, in his treatise, "De Re Rusticâ," has devoted a considerable space to the subject; and his remarks may be consulted at the present time with much pleasure by the lover of bees. It is rather surprising that Virgil (who has made bees the subject of his fourth and most interesting "Georgic") should impart almost as much information as is to be met with in the works of any other writer since his time, each being apparently ignorant both of the accommodation and arrangement of their hives, so as to suit the habits of the insect. It is probably solely on account of the defective principles adopted, that bee-management has been hitherto cultivated to so small an extent in this country, and hence it has not proved more productive. Whilst so little of the correct principle of management has been understood, and the destruction of the bees has been considered absolutely essential, in order to the attainment of their stores, it is no wonder that so little attention should have been paid to their comforts and wants,—that they should have been considered liable to contingencies beyond every other

description of stock, and that the only management deemed essential in their case should be to place them in a box or receptacle, however well or ill-adapted for them, leaving them to chance alone to prosper or fail, until the period should arrive for their final doom,—the reckless destruction of every bee. When, however, the only true principle of bee-management shall be more generally understood and practised, viz., that of basing their domesticated state on our knowledge of their habitudes and instinct, we shall probably find that no stock will be so certain and manageable; and that there will be no department of rural economy which practice may reduce to a more constant and uniform success, because there is none so immediately under our observation and control. Among the moderns, the number of writers who have treated on bees is very great. The University of Oxford, at a very early period, produced minds actively engaged in the study of bees, and continues to furnish a number of individuals who delight in the same researches. It is generally thought that Dr. Charles Butler, of Magdalen College, was the first English author on bees. But in an old treatise on bees which I have in my possession, Mr. Thomas Hyll is mentioned as being the earliest writer on this subject. His works, printed in black letter, commence in the year 1568 and reach to the year 1586. Mr. Edmund Southern, also, published a work on bees in the year 1593: in this he has given the names of other authors, all of whom wrote prior to Dr. Butler. I have not met with any edition of his

work of earlier date than the year 1609. The learned Doctor seems to have set all the bee-keepers of his time in a state of commotion to find out how to construct a transparent bee-hive similar to those used in the time of Pliny; and Mr. William Mew, a clergyman living at Eastlington, in Gloucestershire, appears to have been the first person who succeeded in constructing one upon this principle, which he placed in his garden. Mr. Mew observes, "That, if every clergyman, like himself, kept bees, it would add annually £30,000 to the wealth of England." It is a most singular fact, that so early as the year 1609, the discovery had been made public that there were means of taking honey from the hives without destroying the bees; for, at this period, Dr. Thomas Brown, a divine, left a treatise on bees and bee-hives for the benefit of his native country, in which he states that it is quite certain the ancients made plenty of money by keeping bees, and that they were never killed. The Doctor also gives many sensible rules for the management of bees.

Among these old English writers I was agreeably surprised to find the name of our great architect Sir Christopher Wren, who was a contributor to the general information on this subject, and kept bees in a hexagon hive while he resided at Oxford. A century after Wren we have the Rev. John Thorley, who also lived at Oxford. This pleasing writer will afford much pleasure to any

reader fond of nature and nature's work; and lately we have had produced "My Bee Book," by the Rev. W. C. Cotton, of Ch. Col., Oxford. I had in my youth impressed on my mind an ardent love for all the ways and economy of nature, and I was thereby led to the constant observance of the rural objects around me. The reader will here find that I have noted down my observations, at intervals of leisure, with an endeavour to point out the necessity of apiarian pursuits being so directed as to simplify the management of bees; I have also tried to show that we always succeed best, when nature and art are made to accompany each other. The following remark by Huber, if attended to, will be of advantage to every student. "Man, in subduing animals, in some measure impairs the equilibrium established by nature, and more or less their energy becomes diminished. We should, therefore, try to compensate them for the advantages of which they have been deprived; nay, must do much more, if wishing to augment their products, for we have to contend with nature, which assigns limits to the multiplication of individuals. It therefore demands of us to possess a correct knowledge of the wants of the animals subjected to our use, and it is from them the art of managing them must be learnt." The reader will see this observation particularly applies to the construction of hives when he finds this subject treated of hereafter.

Bees are a race of insects highly entertaining; to the

naturalist on account of their peculiar manners, habits, and instincts, and important to the economist in rural life by reason of their valuable produce. Under the indiscriminate term of honey-bee, we comprehend what are severally named, the queen-bee, or female ; the drone, or male bee ; and the workers, which are females with organs undeveloped, or but partially so. The natural history of the honey-bee has been more fully considered than that of any other creature of the insect tribe, and there appears to be none more deserving of the regard paid to it.

JOHN MILTON.

May 1st, 1851.

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THE

PRACTICAL BEE-KEEPER.

IN the hands of a judicious and moderately attentive apiarian, bees may become a profitable adjunct to rural economy. Even the most humble cottager may be made to participate in the benefit of an improved mode of managing them.

There are in every hive of bees three descriptions of individuals, as before described :—

"First of the throng, and foremost of the whole,
One stands confest, the 'Sovereign and the Soul.'"—VIRGIL.

"The queen of numbers."—WARTON.

THE QUEEN.

The queen, who is the mother, is known from the rest of the colony by her majestic movements, the great length of her body, the shortness of her wings, and she is altogether a more slender insect. She has a sting, which, however, she is seldom provoked to use.

THE DRONE.

The drone, or male bee, is easily distinguished by his large size, his heavy motion in flight, and his loud humming sound. He is the father of the hive, he takes no part in its internal arrangements ; when he goes forth, it is only in the finest weather, and during the warmest part of the day. At the season of breeding there are in a hive

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from four hundred to eight hundred drones. They have no sting, therefore cannot assist or in any way defend either themselves or the other inmates of the hive.

THE WORKER.

The working bees, or neuters, being females of imperfect organisation, are the smallest of the inmates, and by far the most numerous; a well stocked hive will be found to consist of about 20,000; each armed with a powerful sting, which they are ever ready to use, when disturbed in the neighbourhood of their hive.

The sting of the bee is a curious weapon, adapted to the industrious habits of its life, which expose it to a multitude of dangers. It is truly an instrument in every manner calculated for offensive or defensive operations in the annoyance of its enemies. The wound which it inflicts is severe, because it not only strikes deeply, but conveys at the same time a powerful poison into the wound, together with its sting. On the subject of the sting, Paley, in his Natural Theology, remarks—"The action of the sting affords an example of the union of chemistry and mechanism; of chemistry, in respect to the venom which, in so small a quantity, can produce such powerful effects; of mechanism, as the sting is not a simple, but a compound instrument." When the bee means to sting, it flies about the object of its anger very quickly, and by the velocity of its motions seems to evade being struck. The sound emitted at this time is also peculiar; and to those accustomed to bees is perfectly well understood. The danger of being stung may be, in a great measure, prevented. It has been affirmed that a person would be in perfect safety in the midst of myriads of bees, if he were to keep his mouth carefully shut, and breathe through his nostrils only,—the human breath, it would seem, being peculiarly offensive to them. There is not the least doubt but that

a quiet, composed manner, an avoidance of molesting them, and quietly retiring from their hives, are all great preventives.

Writers are not agreed as to the duration of the term of life in the honey-bee. Among the ancients, it was thought to extend to nine or ten years; but this idea is at this time almost exploded. The queen bee is considered to live about four years, the workers about one year. The drone has only a very limited period of existence; few are alive before April, and scarcely one is left at the end of September. The general massacre takes place about the beginning of August. At this time, strongly stocked hives rid themselves of these now useless inmates. Among those who have minutely treated on the subject of bees, many have related very wonderful, and, in some instances, incredible circumstances. They are celebrated for their prudence, industry, mutual affection, loyalty to their sovereign, public spirit, sobriety, and cleanliness. The sagacity of bees in foreseeing rain, or cold, has been often mentioned. Bees require considerable heat. The hatching of the brood in a hive, I believe, never takes place at a temperature so low as 60°. The industry and activity of bees in their domestic labours afford a very instructive and amusing spectacle; all are busily engaged in their several departments, while some are employed in gathering honey and farina; others repair the cells, carry out the dead, guard the entrance of the hive by night and day, during the honey season, keeping their abode free from all offensive matters, and renewing the air within by an ingenious mode of ventilation, produced, fanlike, by the vibration of their wings. Receiving from nature these weighty charges, they labour assiduously to fulfil them; and, while each member of the community acts by the impulse of its individual instinct, it works less for private than for the general good. These industrious foragers may be seen in a genial morning, hurrying with their loads

into the hive in crowds, and jostling and driving one another in the greatest haste; from seventy to ninety bees may be observed in a strong stock to enter in a minute.

Bees in their excursions furnish themselves with three different materials: the nectar of flowers, from which they elaborate honey and wax; the pollen or fertilising dust of anthers, of which they make what is called bee-bread, serving as food both for old and young; and the resinous substance called by the ancients propolis. In their excursions in search of pollen, the bee visits only one species of flower. This is proved by the fact of the little balls, with which they are loaded, being uniformly of one unmixed colour—a wise provision of nature. I proved this fact forcibly to the Secretary of the Society of Arts. A hive of bees placed on the balcony of the Society's House, in John Street, Adelphi, was in full work: the Secretary asked me from what flowers do these bees collect their little loads? I replied, we could soon find out; I then caught one of the little labourers heavily laden, he had just alighted, and was about to enter the hive; I detached the little pellets from each thigh, placed them on a piece of paper, and set the captive free, requesting the Secretary to taste the modicum, which he pronounced to be mignonette. Sometimes a bee is so discoloured with this powder as to look like a different insect; becoming white, yellow, or orange, according to the flowers in which it has been.

The preservation of these industrious and useful creatures deserves every consideration. Man from the earliest period began to subject the animal world to his dominion, and avail himself of its properties and powers to improve his condition. Animals were created before man; but some of them were apparently endowed with their useful and valuable properties for his comfort and assistance. Having used their products for food, &c., he gives them shelter and care in payment! If these arguments have any foundation in truth, it will appear, that animals are

not necessarily dependant on man, and generally derive no benefit from their intercourse and association with him ; but that, in conformity with original appointment, they aid him to acquire the enjoyment and to accomplish the necessities of civilised life.

THE SITUATION OF AN APIARY.

This point requires consideration. It should be placed in a quiet and moderately retired place, sheltered and protected from anything likely to disturb the bees ; and as anything damp, whether from dews or other causes, is very prejudicial, this must be avoided. In my earliest edition I asserted (and subsequent experience has not altered my opinion) that it is not material in what aspect the hives stand, provided the sun shines on the stock once in the course of the day ; and that well-stocked hives, kept dry, and provided due attention be paid to other circumstances calculated to promote their welfare, will thrive in most situations. In England we see most bee-keepers place their hives to face the sun at noon. In the months of July and August this must be most inconvenient to the inmates of a full hive, and no doubt gives extra work in their mode of ventilation, and possibly is one of the causes of their lying outside the hive both by day and night ; the intense heat at this period frequently melts the combs, which causes them to drop, the honey escapes through the hive, and thus attracts wasps and flies to the great annoyance of the bees, and is frequently the cause of destruction to the stock. Whereas, if the hive be sheltered, or placed amongst the shrubs, the bees will pursue their labours peacefully, and much annoyance to the frequenters of the garden will be avoided. Bees are confessedly a very irritable race, and in our frequent inspection of their hives it is more agreeable to go amongst them with a tolerable certainty, than being made to feel their stings. I have

found those bees the least excitable which have had their hives placed out of the rays of a hot meridian sun. I must not be understood to advocate the placing of hives entirely in the shade ; sun they must have, it is essentially necessary in order to disperse the dews of our humid climate ; but the *mid-day* sun, acting upon hives placed during the summer months within the radiating heat of a brick wall, keeps the interior, for many hours each day, at a degree of heat little short of melting the waxen cells. This is the error which I wish to see avoided. We know that cold chills and suspends the animal spirits, and that heat, on the contrary, stimulates them to greater activity ; it is, therefore, only necessary to avoid extremes.

THE BEST TIME TO ESTABLISH AN APIARY.

There exists, even at this time, much difference of opinion as to the best time for purchasing bees in order to commence an apiary. I consider the most favourable season to be about February, but, like old Moore, I should add, " a week or two before, or after," in some years will not be material. The combs are, at this time, empty of brood, and light of honey ; the removal in consequence is safe and easy. Another important consideration, favouring the choice of this time of the year, is that those hives which have survived the winter are not likely to die, unless there should follow some carelessness in removing, or neglect in feeding them. About the end of February, if there has been mild weather, the queen will have commenced laying eggs, and the bees will be engaged in hatching brood ; and, if there is sunshine, these tiny purveyors may be seen leaving their hive in search of farina, the collection of which, however, at this early period, is very scanty. The hatching is still going on, and the stock of food gradually diminishing ; and now commences the time for the careful proprietor to lend assistance ; a little feeding will then

possibly save the lives of thousands, and assist to promote early swarms ; a little stimulus and support will at this time infuse fresh spirits into these industrious foragers, who are excellent economists, and will carefully store up, if not absolutely required, what food is given to them. Many hives of bees, supposed to die of cold, do in fact die of hunger at this period.

Stocks of bees should be selected by competent judges, for their weight alone must not be relied upon at this period (February). If a stock weigh twelve pounds and upwards, it will be equal to one that weighs, in the autumn, twenty pounds. Next to weight we proceed to the number of inmates ; to arrive at this, choose a fine morning, observe the bees carrying in farina, and of course select those in which the greatest number enter. If the season be too far advanced for purchasing stock, swarms may be obtained to commence the stocking of an apiary ; the early ones, that is, first swarms, are the best ; second swarms are not to be relied on, though they will sometimes succeed. If there are one, two, or even three put together in one hive, the risk of their not doing well is much lessened by this union of swarms.

THE REMOVAL OF STOCKS OF BEES.

Evening is always the best time to effect the removal of bees. Every one who is accustomed to this tiny but irritable race is well aware that this is an operation which at all times requires great care and attention. The least mishap will cause him much inconvenience, and possibly the loss of his hive of bees. The swarms, coming out, as they do, in the hot weather, are liable to be suffocated ; a stock filled with combs and honey are liable, if jerked against any substance, to be dislodged from the rows next them, or the whole mass may be jammed together, and consequently injure or destroy the queen, upon whom

alone the prosperity or well-doing of the hive entirely depends. Yet with all these casualties, by moderate attention to a few arrangements, the removal of a stock, or swarm of bees, is easily effected. If the floor, or resting-board, on which the hive stands before removal be a fixture, the hive should be raised two or three inches from the board, by means of wedges, in order to admit the air, which will drive the bees up into the hive amongst the combs. With all stocks of bees this should be done, if possible, the evening before. I have seldom met with persons who are aware that when a hive of bees has stood in one place for a few weeks, hundreds will have collected on the floor of the board. These bees will remain on the floor after the hive is lifted, and prove troublesome to remove ; in default of which, you must submit to leave them behind, and put up with the loss. But if the floor-board is also moveable, which I prefer, you have only then to stop in the bees, secure the hive and board together by a cord, and all may be safely conveyed to any distance. When stocks of bees have arrived at their new home, and placed where they are intended to remain, before you proceed to unstop their entrance, let them be undisturbed till nearly dark ; for as soon as liberty is given, if there be light enough, they will leave the hive precipitately, and many will be lost by not finding their hive in its new situation. If there be one thing more likely than another to cause them uneasiness, it is stopping them close in their hives, which makes them desperate. They run over one another, traverse the combs in haste, search all the hive over, and, if not released in a moderate time, they will be soon suffocated. This, to the proprietor of a newly acquired stock or swarm, will be most vexatious.

PASTURAGE AND BEE FLOWERS.

I am not one of those bee-masters who think it of no use to cultivate little patches for bees. I have found great

pleasure in assisting these indefatigable labourers, and in watching them in search of food from flower to flower. I am aware that bees do best where their food exists in great abundance, such as large tracts of heath, fields of beans, acres of Dutch clover. But still we can help, we can add, to these resources, although it is only in small patches. I believe much assistance may be afforded to bees during the months of March and April. At this period the breeding goes on actively in all hives that are moderately stocked. I have found that almost all early flowers are visited by bees,—all the cabbage tribe, turnips, radishes, and mustard. How easy, therefore, it is to place some of them in by the heels in an obscure corner of the garden, and after they have blossomed, to throw them away. The whole of the sallows and willows are alike useful to them, on this account, that the catkins, or blossoms, are developed at this early period. The poet Virgil says :—

> "Behold! yon bord'ring fence of Sallow trees
> Is fraught with flowers, the flowers are fraught with bees;
> The busy bees, with a soft murmuring strain,
> Invite to gentle sleep the lab'ring swain."

I ask this assistance to augment the supply at this period, believing, as the season advances, food in greater abundance will be readily obtained.

The gooseberry, currant, and raspberry bushes soon engage their attention, and then follow the apple, cherry, and pear ; in short, all our orchard trees, when in bloom, are minutely searched, and seldom without gain. I do not consider it worth while to plant trees, or even shrubs, expressly for the use of bees ; but there are some shrubs so very ornamental, as well as productive of honey, that I will just mention the *Buddlea globosa*, the bird cherry (*Cerasus Padus*), and the *Cacalia suaveolens*, and no doubt many others. I have observed that flowers, which are favourites with bees in some situations, are in others passed

over by them with apparent indifference. I think this shows that climate, soil, as well as seasons, have more influence in adapting flowers to bees than many persons would imagine. I will now mention flowers, one or two of which I consider worth a little attention, both as regards the well-doing of bees and affording pleasure to ourselves. Mignonette has always been a favourite with bees. Those who have paid attention and watched them, must have remarked that this simple but elegant and fragrant flower is an everlasting resource to them. No sooner is it quitted by one, than another and another immediately succeeds in search of the nectar and farina. The honey it affords is of the richest flavour. The Rev. W. C. Cotton observes :—"He must be a very difficult person to please who is not satisfied with mignonette honey." Borage is also a useful plant to bees, and continues in blossom until the frost destroys the stem only; for its seeds will come up in the same place for years. It is an annual. A few seeds may be sown in some retired place, where it will continue without further trouble for years, only requiring to be kept free from weeds. It has been called the king of bee-flowers. In cold and even showery weather, the bees feed on it in preference to many other plants. Its flowers are pendulous; thus the nectar it contains is not injured by rain, and shelter is also afforded to the bee while in search of it. Among the larger resources from which the bees obtain their supplies, and which ranges amongst the natural productions of our country, foremost is the white Dutch clover (*Trifolium repens*). This plant, which is spread almost universally over the whole of Great Britain, is a general and deservedly established favourite with bees. It is universally sought after and frequented by them; it imparts that delicate flavour to our best honey which makes it equal to any of warmer climes. Fields of beans and buckwheat, when in blossom, are much resorted to by them. I have for many years grown many acres of these.

The latter is well known for its usefulness as food for game; but the honey it produces, though obtained in great abundance, is of a coarse and rather disagreeable taste.

BEES ON LAURELS.

I have often observed these little foragers busily engaged during the spring months upon the laurel (*prunus laurocerasus*). My attention was more especially directed to it by the Rev. B. Nicols, of Highwood Hill. This gentleman bestows particular attention to the habits of bees, and is a successful cultivator of them. During the months of April and May he had noticed a more than usual number of bees frequenting his laurels; this they continued to do daily, through but moderately fine weather. I have extensive ranges of laurels, exceeding half-a-mile, and those facing the south were more resorted to by the bees than others. It is the under side of the young leaf they visit. I have met with the following note by a naturalist, which may account for the bees resorting to laurel in such numbers.

"The prunus laurocerasus is not, properly speaking, a deciduous plant, though it casts its leaves during the spring and summer seasons. These long resist the common agents of dissolution, like those of the holly, by means of the impenetrable varnish that is spread over them. This, however, wears off, and they decay; but their destruction is at times accelerated by a small excrescent substance, which fixes on the leaf, breaks the surface, and admits humidity. It appears in the form of a black speck, and, when ripe, discharges a yellow powder from the centre."

THE SWARMING OF BEES.

A swarm of bees is one of the most beautiful and pleasing sights that can be imagined or beheld. The hum,

buz, and activity which is diffused throughout the apiary at this time, is more easy to be conceived than described; it really seems as if this was the most important period of their lives: for the apparent stir is not confined to the one hive which the swarm is leaving; the whole colony seem to partake of the general excitement. This season is to the amateur in bee economy a most interesting period in the life and operations of these extraordinary insects, and affords, perhaps, fully as much gratification as any other part of their proceedings. The exact cause of a hive sending out swarms has not yet been satisfactorily explained: and until we are more accurately acquainted with the economy of these insects, I do not think we can arrive at safe conclusions.

A crowded population may not be the sole cause of this periodical emigration of bees: but it seems consonant to the usual course of nature that it should be the principal one: and we are led to believe that the queen is induced to emigrate in obedience to the wise provision of nature for the increase of the species.

Certain it is that bees in this, as well as in every other country, whether in a wild or domestic state, are found to pursue this habit of swarming. On an average of years, about the end of April or beginning of May, the bees begin to form large cells on the edges of the combs. These are the cells from which queens are to proceed, the population having rapidly increased by this time, and the heat of the hive having greatly augmented from these exciting causes. The queen hurries over the combs from one quarter of the hive to another. This agitation is quickly communicated to her subjects, and, accompanied by a multitude of them, she rushes out of the hive. Every swarm is composed of a queen, a number of workers, and a somewhat uncertain number of drones. A good swarm will weigh about four pounds. Four thousand bees are contained in each pound; consequently, a good first swarm

may consist of from fifteen thousand to twenty thousand bees. I may here state that the straw hive commonly used by cottagers weighs about six pounds when empty.

THE INDICATIONS OF THE BEES IN A HIVE ABOUT TO SEND OUT A SWARM.

The approach of this interesting period is made manifest to the bee-master by many significant signs. For several days previously, the bees may be seen in clusters at the entrance to the hive, and at night they will often lie out. An unusual number of drones may be observed to leave the hive about the middle of the day, if fine. In short, to a common observer, there are some unmistakeable proofs that the hive is now full, and that a new colony is about to establish itself in a new domicile.

This is always the case with first swarms; with those that come after the indications will be less marked. The bee-keeper must look, and count his time. A first swarm never departs but in fine weather. The hour is uncertain, as the aspect the hive is placed in has some influence in determining the precise period of departure. They may be expected to leave from nine in the morning until four o'clock in the afternoon. The two principal swarming months are May and June.

THE HIVING OF A SWARM OF BEES.

From the indications before alluded to, every bee-keeper should be prepared with a new hive ready for an expected swarm. I have known many prime swarms lost for want of this precaution. The bees, after whirling about in circles in the air in "*regular confusion*," will alight on some branch, or low shrub, and there form themselves into a cluster; and, as soon as the greater part has fixed themselves to the spot, preparation should be made immediately to hive them.

I propose to take the cottage straw-hive for the exemplification of this process of hiving bees. I intend to describe here what will be applicable to every other description of bee-hive ; for, although it cannot be uniformly effected, on account of the various positions in which bees settle, still the principle, the preparation, and the mode of operation, will be the same. In consequence of a belief in the reality of the sense of hearing in bees, the practice is common of beating sonorous bodies at the moment of swarming, in order to prevent them from communicating with one another, and thus to present an obstacle to their flying away. I do not intend to pass over these tinkling sounds, made on these occasions, I have not any objection to a moderate amount—not that I have a superstitious belief in their effects, but I am delighted with the sounds which invariably fill my heart with gladness. The occasion too must be one of either pleasure or profit to every one, injury it cannot be to any. Moreover, I have found the practice useful, the swarm-watcher has thus called me to the spot when I have been elsewhere engaged. I consider it matters very little, it is harmless, and I would not interfere to prevent it. Another practice I consider immaterial whether adopted or not—it is that of dressing the hives with sweet liquor before placing the swarm within it. I am aware that the bees will like a clean hive either of straw or wood, but I have seen so much indifference shown to secure their having a fit habitation that I would not prevent this appearance of over kindness. It is no uncommon sight to find a spare hive used for the purpose of putting bulbs or seeds in to dry, and *a hive* being "just the thing for such purposes," they are in constant use for many weeks or months, even till the swarming season requires them to be looked for ; in such cases, and they often occur, this rubbing and dressing helps to free the hive of many impurities. I would only admit the dressing to be composed of sugar and water, or honey diluted with

water. There is one more of the practices of "the sages" in bee-management which I could never find of the least service either to the insects or to the owner—I mean the sticks they place across the inside of the hive; this I condemn as utterly useless, nay worse; to the hive of bees it is positively injurious, by preventing a healthful circulation of air: and the bees, in an endeavour to avoid the sticks, build their comb in all shapes but straight; and when the combs are wanted, in a hive that has been *crossed* with sticks in three or four places, the trouble is greatly increased. The mode of hiving bees is well understood by all those persons to whose lot it generally falls; other persons, who have once seen it done, will find it much easier than reading how it should be performed. By way of showing the process in the most simple form, I propose to relate the custom of our old hivers; these persons are found in every village, and well known for their alacrity in coming at the shortest notice. To begin:—The clustered swarm is glanced at; its situation as respects convenience for the hive; the hive itself is then compared as to its proper size which the swarm may be supposed to fill; the interior is inspected, that all projecting straws, which would give the bees much extra trouble, should be removed: in order to do this a stone rubber and a coarse cloth are employed; next he requires "the dressing," (usually a jug of beer, with some sugar to sweeten it,) with a soft hint, that "some persons that do well with bees allow good ale;" for he has known those hives, for which *water* and *sugar* were used, to be deserted by the bees; at all events "the bees did not settle to them nicely." To continue:—In the absence of a brush to diffuse the sweet liquor regularly over the interior, he gets a few sweet herbs, bean-tops will do; a very little dressing is used; his face, hands, and bare arms are then smeared over, this prevents anger; only one thing more remains to be done, the toast, "Good health to the owner, and may the swarm prove lucky;"

this finishes the jug of dressing. He sets about his work cheerfully. A stranger to bees would behold with astonishment how gently he sweeps, shakes, and handles this multitude of armed, and, at other times, resentful insects; but he has nothing to fear, and *our experienced handy man in a few minutes has succeeded;* the bees are in the hive settling themselves; he places them on a cloth, the hive resting on the brick; he shades it with green branches, or whatever is at hand, and then he leaves them for a few hours; or, if desirable, in half an hour he lifts them on to their appointed place. I consider this sufficient instruction for the hiving of swarms in general. There are, no doubt, cases of swarms settling on very awkward parts of trees and shrubs, and no uniform instruction can be given. The exercise of thought and some judgment will occasionally be required. A hive rubbed inside with sweet liquor, and mounted on a stick, just above the cluster, will in some cases be taken possession of by this knitted mass. On the other hand, when they cluster on a low branch, the hive should be reversed, and with a gentle shake the principal part of the mass will fall into it. An important thing to be observed in this and in most other operations with bees is, quiet; this is essentially necessary. Also to be calm, collected, and prepared with everything that is required. Every writer on bees has made similar observations. A timid and inexperienced person may shrink at the description of some of the dangerous operations effected with such irritable subjects, and will be disposed, on every occasion of the kind, to ensconce himself in defensive armour. In depriving bees of their hard-earned stores, or interfering in any way with their hives and brood, he will do well to protect himself by such means. But with regard to swarms, he need not be under any apprehension. Every person accustomed to bees knows how safely he may go into the midst of a newly-created swarm, not one bee of which will molest him, unless he accidentally crush

or injure it during the act of hiving. They are so intent on the great object of their emigration, the acquisition of a new abode, and so anxious about the safety of the queen, that what on all ordinary occasions would draw forth their vengeful sting, now passes utterly unheeded by them; and a person may, in the event of a swarm clustering in an inconvenient spot for being hived, lift them in handfuls, like so much grain, without in the least suffering for his boldness.

In hiving a swarm, the articles required, in addition to the proper hive, are a cloth to spread under the hive, and a brick to support its edge, so that all the bees may readily enter it. Give the swarm, when hived, a little shelter from the heat of the sun, by any means that presents itself, whether green boughs or an umbrella, and you may leave it to abide on the cloth till evening, when the hive, with its inmates, may be safely lifted to the place appointed to receive them. I recommend the hiving of the swarm to be commenced as soon as possible; for if the bees be suffered to remain any considerable time where they have settled, they are apt to rise again, and the owner may thus chance to find that his best swarm has left his apiary altogether. At the approach of the swarming season, it is well to place an empty hive or two in the apiary, to be ready for the reception of swarms.

SECOND AND AFTER SWARMS.

At a period of about twelve or fourteen days after the departure of the first swarm, the same hive will be ready to give out another swarm, and sometimes when every circumstance has been in favour of the breeding of young bees, the mother hive will throw off a third, and even a fourth swarm. Our fondness for having our Apiaries stocked with a great number of hives, is apt to make us overlook the disadvantage of having puny stock-hives, which give much trouble and are seldom productive.

He is a prudent bee-keeper, who takes but one swarm from each stock; he may, generally speaking, depend on having stronger swarms, and a greater quantity of honey.

VIRGIN SWARMS.

When the swarming season has commenced early, and proceeded under very favourable weather, a strong first swarm sends forth sometimes a young colony, headed by the same queen. At the end of a month from the time of her leaving her original abode, she issues forth, and leads out a new band of emigrants. The honey produced by this swarm is called Virgin-honey; if it has been obtained exclusively from such hives, and kept separately, it is remarkably fine.

HOW TO FORM ARTIFICIAL SWARMS.

This discovery by the German Naturalist, Schirach, has now become an established fact. It is not generally practised in this country, owing probably to the want of sufficient practical skill, in most of those who apply themselves to bee-husbandry. From repeated experiments it is known, that bees can procure a queen for themselves, provided they have a comb containing larvæ not more than three days old, in the common cells, and that nothing but certain important conditions, such as a particular kind of food and more spacious lodgment, are requisite for the conversion of common larvæ into queens.

The general period proper for the operation is about eight or ten days previous to the time when natural swarms might be looked for; at that time it is likely royal brood will be found in the combs, or at all events, abundance of eggs and larvæ of workers, to rear an artificial queen,—and the males are also at this time numerous; a state of things indispensable to the success of artificial

swarming. It has been remarked, that "the egg of a worker, placed in a royal cell, only produces an insect which has its powers more fully developed, in proportion to the ampler space which it occupies, but it acquires no *new powers*. The germ of the ovary existed originally in the *common bee* as well as in the mother-bee; but the confined limits of its cell, and the want of the peculiar food provided for the royal race prevented its development." The mode of operation I now give is described by a person who practised it twenty years back, and has repeated it almost every year since, with the same success. "From the first to the third week of June, our hives had all thrown their top or prime swarms. But instead of sending off their seconds, or casts, ten or twelve days after, as is usual, four of them had not done so until nearly three weeks beyond that period. This was, in all likelihood, owing to an unfavourable change of weather. From the crowded condition of the hives, a mass of bees, as large as a man's head, hung from the alighting-board of each, a grievous sight to the apiarian, as these hangers-out are quite idle. We resolved, therefore, to try artificial swarming with one of these hives, and to regulate our proceedings with regard to the others according to the issue of this. We carried the full hive into a dark place, turned it up, fixed it in the frame of a chair from which the stuffed bottom had been removed, placed an empty hive over it, joining them mouth to mouth, and partially drove it. As soon as we perceived that about half the bees had ascended into the empty hive, knowing that in these cases the queen is generally amongst the foremost, we immediately replaced the old hive on its former station, and removed the new one, containing the queen, to a distance. As the former had plenty of eggs and young brood, they were at no loss to procure another queen; while the other having a queen, proceeded to work in all respects as a natural swarm." With all hives that open in two parts the opera-

tion is very simple, more satisfactory, and less dependent on contingencies. Early in the morning, or in the evening, when the bees are all at home, gently separate the hive, apply to each full half an empty one of exact size, then fasten them together securely. We have thus two hives, each half full of bees, brood, and honey. One of them will possess the queen, and the other will have royal brood, or at all events, eggs and larvæ of all ages wherewith to originate a queen. Let both doors be closed, that there may be no communication. Two or three hours afterwards listen attentively to each, and it will be readily ascertained from the quiet state of the one, and the loud disorderly buzzing of the other, that the queen is present with the former. Carry off the one with the queen, and shut it up in a dark apartment for twenty-four hours, leaving the other in the original station, which will in twenty-four hours have set about forming an artificial queen, and the operation is finished.

IS A MILD OR A SEVERE WINTER THE BEST FOR BEES?

It has become a question among bee-writers, whether a mild or a severe winter be most favourable to the health and well-being of these insects. In a hive well and properly made, supplied with plenty of inhabitants, combs moderately fresh, the hive placed in a dry quiet place, left undisturbed, already having its own supply of food; with these conditions, I believe it is of very little importance to the inhabitants of what nature the winter may be. If it be severe they have enough of internal heat to preserve them from the severity of the external atmosphere, and to prevent the honey from candying. But the case is far otherwise with a hive, thin in population, and scantily provisioned; their numbers are too few to keep up the vital warmth, and they are in danger of perishing should the weather continue severe for a lengthened period; and

therefore the bees coming safely through the winter season depends, in almost every case, on the abundance of population and of food. Want of numbers is injurious, not only because it is accompanied with the want of the requisite warmth, but also because it seems greatly to dispirit the bees ; and there are many instances of hives being deserted in the spring while sufficiently provided with honey, they having been disheartened by paucity of numbers.

UNITING SWARMS OF BEES.

This very useful practice is too seldom adopted in England. There ought not to be a question that double the number of labourers will obtain more in a given time than half as many would do ; and this particularly applies to bees in our changeable climate. All strong stocks provide for themselves more food than the weaker or thinly-stocked hives. In the case of second swarms, I invariably put two or three, or even four, together. The method of doing it is so simple and easy, that let it be once done, and I think every bee-keeper would, after one year's experience of its benefit, never run the risk of keeping a second swarm or cast without uniting them. During the season of 1850, the bees at one of my apiaries were very late in throwing off their swarms : I wanted to fill a box hive,—and, having waited throughout June and the principal part of July, I left orders for every swarm to be hived into this box ; and the result was—four good swarms were placed in the box, and all of them "July swarms." I will now describe the method in which my orders were carried out : my man, not much accustomed to bees, found no difficulty in accomplishing it. The box, a new one, was to be rubbed inside with sweet liquor, and set out near the apiary, day after day, protected from the sun ; but placed so that the bees could visit it—which they did not fail to do ; and, before the swarm was hived into it, another

dressing of liquor. The first swarm came out about three o'clock, on the 20th of July ; this was immediately hived into the box,—left, shaded from the sun,—and, at eight o'clock, removed to its appointed place. On the 23rd of July, two other swarms came out: each of these was hived, separately, in a common straw hive, and, at eight o'clock at night, a cloth was spread on the ground near to the box hive, a brick placed on the cloth, and then one of the swarms was brought to the spot, and, with a smart knock on the brick with the edge of the hive, all the bees fell in a heap on to the cloth. The box was then set over the heap of bees ; one of its edges resting upon the brick gave space and enabled the bees to *crawl* (for they will not take wing after dusk) into the box : this they did quickly, and, in less than an hour afterwards, the other swarm was treated precisely in the same manner. The box was left on the cloth all night, and early the next morning put back to its place again. The fourth swarm was hived July 31st, in the same way—*i. e.*, first into a common hive, and then, at the hour of eight o'clock, the same plan was pursued. Therefore, in this box, I have now four swarms—all from separate stocks of bees. They united themselves without any trouble or fighting about queens,—this "the bees themselves settle,"—and are now working as actively and harmoniously as any other stock, in their "Mansion of Industry" at the *Crystal Palace.*

THE UNITING OF BEES WITH BEES.

FOR THE PURPOSE OF INCREASING THEIR NUMBERS, AND SAVING THEIR LIVES.

This requires a different mode of treatment to the union of swarms ; and, in offering these observations, I wish to be understood, as not advocating every system of bee-manipulation or bee-management contained in these pages, but, in order to make a treatise complete, on the practical management of bees and hives, I am induced to give

directions how these various operations can be performed. These will be partly from my own experience, and, in some instances, from writers upon bees who have given a detailed account of their methods of effecting the same object. I would also advise all persons about to attempt these more complicated movements, to consider well the object they wish to attain, and to satisfy themselves whether it be desirable, before they risk the loss of their stocks. The union of natural swarms I have before adverted to, and shown how easily it can be performed ; I will now give directions for the driving of bees, the union of stocks, smoking, partial suffocation, &c., &c.

THE UNION OF BEES OF STOCK HIVES.

Each stock of bees having combs of their own, also honey, farina, and young brood, are very reluctant to leave their stores, and the operator must be prepared for their full determination to resist any interference with their citadel. Therefore he should provide himself, to be proof against their stings, with a stiff veil and a stout pair of gloves. The apparatus required will be a three-legged stool, a large flower-pot, or a common house-pail : either of these, in ordinary circumstances, will answer to receive the hive about to be reversed. I choose the common straw cottage hive as an example of the mode of explaining how this operation is to be performed. In addition to the pail, a wetted or damp towel, and two sticks a foot long and half an inch thick, complete all the required materials. The preparation, previous to commencing, is, first to raise each hive on one side, about an inch, by means of wooden wedges ; this may be done one or two days and nights before, so that no bees may remain upon the floor-boards, that all may be up amongst the combs of both hives. The best season for the union of stocks of bees is in the autumn, about the end of September, and for the

spring, usually the end of February, or early in March ; should the season be a late one, April will do. Having prepared the two hives, by wedging each, and finding the bees have left the floor boards, choose an evening, dark, dismal, and wet ; it matters not so long as there is light enough without the aid of a candle ; then proceed as follows :—Take the pail near to, but not in front of the hive ; reverse the hive you want to rid of the bees into the pail ; *i. e.,* the crown of the hive in the pail, and the wide part uppermost : quickly set on this the empty hive you intend to receive the bees, and with the towel bind round the two edges, so that not a bee can escape ; let the two edges meet nicely together, and keep the top hive steady, so as not to alarm the bees in the other hive if possible ; with the two sticks beat gently round the sides of the lower hive,—*gently* for fear of loosening the combs. In a few minutes the panic-struck bees will pass into the upper hive ; you may soon afterwards separate them ; carry the bottom hive, now nearly freed from bees, into a dark room or outhouse ; the next morning what bees remain amongst the combs may be made to quit and join the other hive. The hive now with bees in it, but combless, is to be reversed—*i. e.,* crown downwards into a pail, and receive a good drenching of sweet liquor, administered over them by means of a small watering pot ; this having been done, set over them the hive you wish to receive this addition to their numbers ; they may be left in this position all night, and on the following morning the upper hive will have permitted the bees to mingle with them, and all will be ready for the removal of the reinforced hive, which may be put back to its former position. The same effect on the fears of the bees may be produced by smoking them ; and the process of doing it is similar. The smoke may be produced by damp rags, by tobacco, or fungus. The driving of bees, as it is termed, is not new in bee-management. The state of hives, the seasonableness of the weather, and

other causes, nevertheless, are important to insure success. I have also succeeded in uniting bees which I have obtained from persons about to destroy them, when they wanted all the honey from the hives. These extra bees are obtained by reversing the hives as before directed, and when they are in the hive empty of combs, by tying the hive round with a coarse open cloth so as not to suffocate them; they may then be safely carried to any distance in the evening. A few whiffs of smoke from a cigar or pipe into both hives, the one about to receive the strange bees, and the bees without cells or food; this smoke has the effect of making both families smell alike; if the full hive be turned mouth uppermost, and the hive with bees only placed over the full one, a few raps on the top will dislodge the bees; they will then fall between the combs, and mingle with the others; the empty hive is to be taken away, and the full one placed in its former position.

DEPRIVING THE HIVES OF HONEY.

There are three modes of taking the honey,—partial deprivation, suffocation, and driving; that is, forcing the bees to quit their magazines, and uniting the expelled inhabitants to other hives. Those cultivators who pursue the system of appropriating a portion of the honey accumulated during the summer months,—who content themselves with a share only of the fruits of bee-industry, and who make use of hives conveniently constructed for this purpose, by which the available surplus can be seen and accurately ascertained,—will be engaged in preparing for thus sharing the products of the hive with the bees.

TO REMOVE GLASSES OF HONEY.

When a glass is properly filled with combs and honey, the bees seal over the cells, and all is ready for its removal, as the bees will have mostly retired from it. As soon as

this is perceived, prepare to remove it in the following way:—if there is plaster, or any material round the bottom, remove this in the first place, and separate the glass with a thin knife. Do this the over night or the day before. All being ready, choose the afternoon, when the sun is off; be prepared with another glass to put on, and a dish or plate to set the full one upon; with one hand take off the full glass, set it on the plate, and with the other put over the empty glass; cover it over, and leave it; remove the full glass on the plate into a darkened room or outhouse; retain the bees in their position about half an hour; then raise the glass a few inches by means of two sticks, to enable the bees to escape; admit light, and an opening for them to escape, and the bees will presently fly and return to their hive. Do not leave the glass, lest the bees should return, which they sometimes do in great numbers, and carry off all the honey; a few taps with a quill on the glass may be made, and the bees will all quit; repeat the same process to any number of glasses; this can be done at all seasons; and, I believe, this plan will be found to answer as well as any other. From long experience, I remove small glasses at any time of the day; if I have room, I walk backwards with the glass in my hand, shaking the bees out on to anything green that is in the garden. Thus I save the time of keeping them prisoners; but some care is necessary, for fear of spoiling or breaking the glass; and the bees are most furious if you give them but half a chance to inflict their stings. Their anger is somewhat appeased after being confined for some time.

TAKING OFF A STRAW CAP OF HONEY.

The method adopted to effect this is the same as with a glass; but when it is larger, there is more chance of having more bees in it in proportion; and the greater the quantity of bees the more reluctant will they be to leave: therefore

more patience is required. I always place an empty glass or cap over the top of the hive after I have removed a full one; the bees amuse themselves under it by licking up the little honey that is spilt. If the season is before them, they will set to work to fill the next glass, or the next cap, and this they will do in a surprisingly quick time; about two pounds per day is not an uncommon quantity; and in general this second quantity is obtained in a much shorter period than the first.

HOW TO REMOVE LARGE QUANTITIES OF HONEY.

When it is required to take away large portions of a hive, or to divide a double hive or a triple one, there is more trouble to make the bees quit their stores than with a glass or cap, containing probably only honey; whereas these large portions or parts of hives contain brood also. In order to explain how this is to be done, I propose to state the process pursued by me in separating a double box-hive when in full work, and fixed in the library of a gentleman's residence near London. The hive was constructed of two parts, in all respects equal and similar; from the glass windows there appeared about the same number of bees in each part. By applying my hand to the glass, I judged from the heat that the queen was in the lower division; I therefore decided to take away the upper half. The first preparation was to get the outhouse ready to receive the box, to see that the window in it was free, and that the means were at hand to darken it. Secondly, the bench ready to place the box and bees upon, a few rags in a flower-pan, some damp hay or straw to assist in smoking them, a pair of bellows, a light in a lantern, a cigar, a handkerchief to cover my face, and a pair of gloves. With these, and a few feathers from the wing of a goose, I was prepared to set at liberty a strong colony of bees, which could not have numbered less than twelve thousand.

And now, to prepare for the removal of this armed force, a pair of zinc dividers, the full size of the box-hive, one-eighth of an inch thick, a stout knife to separate the edges of box from box, was all that I required. My assistant kept the upper box steady while I pushed in, between the two, one of the dividers. This done, a second divider was in the same way introduced over the first (it was useless in this instance to wait to see in which part the queen was). My assistant, therefore, carried off the box now on one of the dividers to the outhouse, one divider remaining on the top of the lower half of the hive; this I removed, and placed on a proper top-board (this storied box was made of best Spanish mahogany, and highly polished). The bottom box now formed a hive complete, of one story only, instead of two. Not a bee had escaped into the room; all was perfectly quiet, excepting a louder buzz in the hive. I overtook my assistant before he had reached the out-house, and relieved him by carrying the box the remainder of the distance (about three hundred yards), and placing it on the bench opposite to the window. We commenced with smoke, reversed the box, and partly withdrew the divider. The bees soon began to leave; they flew to the window (the only place that light was admitted), made their escape, and returned home to the hive, still in its usual place. Having before observed that bees, when in large numbers, always leave with reluctance, a few gentle raps at the box, and occasionally blowing the smoke amongst the combs and bees, caused in about an hour after a visible diminution of their numbers. We now took a peep at the half hive in the library, and soon perceived, by means of the glass windows, that the number of bees was greatly increasing; thus we were satisfied that all was proceeding in proper order. In about another hour, nearly all the bees in the outhouse had left the box; what few remained, when they came to the upper side of the box, were, with the assistance of feathers, made to quit; and in about

three hours from the commencement, the whole was free. Their numbers could not have been short of twelve thousand; it had always been a very strong working hive, and had never swarmed. The box of honey was taken into the house and weighed, when it was found to contain forty-five pounds of fine honey. In relating this operation, I hope I have fully explained the general method to be pursued in the removal of all large portions of hives, by giving these details of my apparatus and proceedings in this case. I will now refer to the necessity of feeding bees, not merely on account of their owner having taken from them too much, and thus deprived them of their winter support, but also as arising from our ever-changing climate. It often occurs that stock hives and swarms of the current year are unable to collect sufficient food to maintain themselves through those months when all the fields and gardens are to them a blank.

FEEDING OF BEES.

THERE is no branch of bee-management which requires more attention than the feeding operation. The few bees that are seen at the end of February entering their hives, with their yellow loads on their thighs, derive them almost solely from the snow-drop, the crocus, and the furze-blossom. At this early period, the owner has it in his power to minister essentially to their welfare, by supplying them plentifully with honey or syrup of sugar. Even to the well-provisioned, a little additional supply will be welcome, and prove advantageous, infusing fresh spirits into the hard-working labourers, encouraging the laying of eggs by the queen, and consequently contributing greatly to the rapid increase of the population, and to the production of early swarms. The consumption of food in spring is very great, in consequence of the prodigious quantity of brood reared—the queen laying at the rate of from one hundred

to two hundred eggs daily. Consequently, more honey is consumed in the months of March and April than during the preceding months. We need not fear being over-liberal—the bees are excellent economists, and will carefully store up what we entrust to them. It is of material importance in feeding, to guard against the admission of stranger bees. It will frequently lead to plunder, and possibly death, if they are attracted to the hives by the smell of the syrup. Proofs of the acuteness of the sense of smelling in bees are very numerous, and may be ascertained by the commonest trial; and when general feeding is provided (that is, when all the bees of an apiary are to receive a benefit), the food should be given for them to search for at some distance from the apiary.

The food administered to bees is of various kinds—every bee-keeper having his favourite composition; before I proceed to give directions how this artificial food is best composed, I will give a short extract from a work on the subject of feeding bees, by Doctor James Howison: I consider his observations worthy of notice. The Doctor remarks:—"Sugar simply dissolved in water or beer, which is a common practice, and sugar boiled with either of these fluids into a syrup, form compounds very differently suited for the winter store of bees. When the former is given for their immediate nourishment, as in the spring, it will answer equally as well as syrup; but if it is laid up by the bees as store, the heat of the hive quickly evaporates the water, and leaves the sugar in dry crystals, which cannot be eaten by the bees."—Bees will, in the autumn and early spring months, partake of almost any sweets that they can gain access to. Caution is required that the honey be not acid, nor the syrup in a fermented state: candied honey is poison to them—no bees can live in a hive if the honey in it becomes candied. I have before observed that I always prefer honey when it can be obtained. The proportions requisite to form the syrup, of

a proper consistency for this purpose, is one pound of sugar and one pint of water ; if a small teaspoonful of salt and half a wine-glass of rum be added to this quantity, it will be found to keep rather longer.

SPRING FEEDING.

A writer on bees—one who has kept them for forty years—observes : "If your bees require feeding in April, be sure to give them a supply : the proper time is about seven o'clock in the evening. In the morning, as early as you can, remove what you have fed them with in the day. They are very eager after honey, as there seldom is any for them in the flowers at this early period, and they will have it if they can find it any where. Sugar is preferable to honey only in one respect,—which is, the bees will not rob for sugar half so eagerly as they will for honey."

A piece of honeycomb is, at all times, the readiest thing to give as food, and even an empty piece of comb will likewise be found most useful to administer the syrup to the bees. If it is intended to give them food in considerable quantity, the best way is to raise the hive on to a round or square frame of wood, about three inches deep; place the combs in the vacuum, then set the hive on. The bees will soon empty them of their contents. The best time is the evening. Once or twice, if a few pounds are given them, will generally be sufficient. Another plan is, to give them every evening just enough for them to remove, and early the next morning take the feeding apparatus away. Some persons use hollow troughs for giving the syrup to them in small quantities, which they fill and put in at the entrance hole of the hive. Fountain bee-feeders are constructed after the shape of the bird-bottle : these are made with tin, are shaped to fit the entrance hole of the hive, and thus prevent all other bees from entering at the time they are thus in use ; a great variety are also made for top-

feeding. These have round holes in the centre, through which the bees pass up into the feeder, and return with the food into the hive. In all cases, the food is to be covered, to prevent strange bees taking it except those of the hive for whom alone it is intended. When more general feeding is adopted, I use old hives of comb and honey: these are always to be had at the end of summer, and this is the best way in which food in a large quantity can be given to them. The bees feed without soiling their legs and wings. By placing their food as far from their homes as is convenient, all chance of a quarrel or fight is prevented. Turn it upside down or any way—the bees will clear it all out and return to their hives before the chill of evening sets in.

I will now bring my observations on the management of bees to a close, and proceed to the various hives and their proper management.

To the question so often asked,—which is the best hive? —I do not think a satisfactory answer can be given; for we must first be informed of the object aimed at: whether it is the pleasure and satisfaction to be derived from keeping bees, or if it be for amusement blended with profit? Persons who keep them often have many objects in view. They require a hive which will enable them to show their friends some portion of the mysterious workings of this wonderful race of insects, and this therefore gives rise to the variety of inventions we so often see,—each being the best for the purpose for which it is desired. It will appear, from this and other circumstances, almost impossible to construct a hive of universal adaptation; nor can we pursue one general system of bee-management. We must vary and adapt our contrivances to meet the wishes and wants required. It must be impressed upon the amateur, that all his appliances must be made to act in accordance with the habits of the insect. The materials to compose a bee-hive are also various: my experience

prompts me to acknowledge that straw is the best. I have succeeded in using cork, which also is a non-conductor of heat: this material requires to be combined with wood or iron to give it strength.

THE COMMON COTTAGE STRAW HIVE.

This hive is so well known that it will require but little comment; yet two or three points on its general management may be found serviceable. The hive, with the stock of bees in it, should be kept dry—(this is very important);—it should be placed in a moderately exposed aspect, not near to a hedge or wall, but at a distance sufficient to allow a passage to the back, although bees, by being accustomed to it, will permit their hives to be approached in front. It is not safe for a stranger to venture in that direction, for it excites and often causes them to be angry; whereas from behind their hives, persons may approach them with safety. Care must also be taken that these hives are made of clean and good straw, and that they are of a suitable thickness: some are made so thin and loose, that it takes the bees two or three days to render them fit for the reception of combs and honey. This may be ascertained by placing the ear near to the new swarm. The first night and next day of its being hived, a constant tearing and gnawing at every snag, or little projection, in the interior, will be going on until it is made smooth, and every crevice stopped. This, of course, consumes the time of a great number of bees, which otherwise would be employed in searching the flowers for honey and farina. A few weeks about the season of bees swarming, is the most valuable portion of their time. It is an ascertained and most interesting fact, that a swarm will have to collect twenty pounds of honey, or thos e materials that the bees convert into honey, in order to

build combs and cells, to be hereafter filled by them with honey in a common hive.

The cottage straw hive is in more general use throughout Great Britain than any other, and is in consequence always called the common cottage hive. These hives are made to hold more or less, according to the usual custom of various counties. The hives in use in Bedfordshire contain, when filled with combs and honey, about 40 lbs.; those in Hertfordshire and Cambridgeshire about 35 lbs.; the "bee-skep" in Suffolk and Norfolk, about the same weight. Surrey and Sussex, 30 lbs.; Middlesex, Berkshire, Oxfordshire, and Hampshire, 30 lbs.; Wiltshire and Dorsetshire, 30 lbs.; in Devonshire, the "bee-butt" is made to hold 35 lbs. In all these counties, I have found individuals keeping their bees in hives of smaller, and others in hives of larger size; they generally explain as a reason, that they have in their neighbourhood sainfoin, beans, clovers, or lime trees, in abundance.

The bee-hives in use in Scotland are generally larger than those we see in England; and in addition to the size, the Scottish bee-keepers practise "ekeing" their hives (which means an addition of one-third to its size):—this enables them to obtain a very considerable bulk of honey, at the season of taking it, by means of destroying the bees. I have received several hives of comb and honey from Scotland, each of which weighed upwards of 70 lbs.; and one in particular, I may notice, weighed 86 lbs! The straw hives, used in all the northern counties, are very properly made of thicker coils of straw, and are in consequence warmer, and not so easily affected by atmospheric change.

These common hives are useful to keep as stock hives; they are inexpensive, and require so little attention, that once placed in a good situation, protected both from rain and mid-day sun, with the usual care bestowed on live stock, and no more is required. Under these circumstances, bee-keepers will never regret having a few stocks of bees

in such hives with which they may supply a friend, and send them to him at any distance. Every hive should have its separate board to rest upon, and that portion for the bees to alight upon should project about four inches in front of the entrance to the hive, so as to allow the bees plenty of space. It is scarcely necessary for me to add, that all hives should be placed securely, and not left liable to be blown over, or thrown down by accident. Various coverings are used for this hive,—the straw hackle by the rustic cottager, and the turf by the labourer; these are the most common. The farmer's wife employs the spare milk pans, which answer the purpose of keeping out the wet from the crown of the hive. The two first coverings are each liable to entice a mouse to take up his winter quarters under them. He is a great annoyance to bees, and not unfrequently bites his way through the crown of the hive, and destroys the stock. A few times lifting up the *covering* during the season when the bees are in a torpid or inactive state, will be sufficient to rout the intruder; or, as soon as discovered, the traps must be brought into action. Be sure your stocks are looked at about Michaelmas, and that the house and board is clean; then plaster them round to the board, leaving quite a small entrance for the bees to get in and out. Again in March, lift the hives up from the board, and clean them. This will save the bees a great deal of trouble. The shape of the cottage hive is considered more effective in preserving bees through the winter months than any other hive in general use.

THE IMPROVED COTTAGE STRAW HIVE.

(WITH A STRAW CAP, OR BELL-GLASS.)

This addition, though simple in contrivance, is very effective in its operation, and enables the bee-keeper to obtain a fair share of the surplus honey, and to act up to

the wishes, without deserving the remonstrance, of the poet, who truly says,—

> "Leave them happy in their copious store,
> A part they'll give; and why desire ye more?
> And must ye kill?—Mistaken thought—ah, shame!
> No more involve them in sulphureous flame."

I am sure no true lover of bees ever lighted the fatal match to destroy his little innocents with flame and smoke without feeling much reluctance and regret. I know of no right we have, morally speaking, over the life of the meanest insect. Avarice often mistakes its own interest. It is, therefore, infinitely more to our advantage to spare the lives of bees than to kill them and take possession of their store; and as keeping bees for merely what can be obtained from them has no really moral tendency, so it would be worse than useless, if it did not tend to improve the taste, and enlarge the sympathies of our nature. Cruelty is the common vice of the ignorant. Cruelty is invariably condemned in Scripture, but "shewing mercy" is invariably upheld; and while humanity justly recoils from the act of killing bees, the philanthropist is led to adopt such a system of management as will secure to him a fair quantity of their produce, without causing them any injury.

I am induced to give here the rules and method of management as regards this hive, adopted with complete success, for a long series of years, by the late Mr. Hodgson,* who was a true lover of bees, to whom I was indebted for many valuable hints; and I know that several members of his family are still pursuing the same plans which were so successfully carried on by their father.

Mr. Hodgson observes:—"I have taken honey from bees in the way herein directed, with success, for more than thirty years; nor have I seen any way pointed out, by the various writers on the subject, in which it can be

* Instructions to Keepers of Bees. London, Printed for H. T. Hodgson, Bookseller, corner of Wimpole Street. 1816.

taken with so little risk and inconvenience to the bees, nor with less danger to the person taking it away. And in no way can it be taken in a purer state ; for I have sometimes had the small cap put on, filled, and taken off in eighteen days. The honey so taken off will be more valuable for sale than when taken in the usual way, as well as getting it to market six weeks or two months earlier than it is generally sent.

"When the hive gets full of bees, which is usually in April, or, at farthest, by the middle of May, this is the fittest time to set on the small cap (or bell-glass). Remove the bung, or whatever has been put over the hole on the top, and place a small straw hive over—then lime or clay it round, to make it air-tight—by so doing it becomes part of the hive ; and as the bees at this season are most anxious for the increase of their numbers, having the greatest part of the hive they have wintered in occupied with their young brood, or bee-bread, they are more ready to lay their honey into the small hive on the top than in any other way. The small hive will frequently be filled in the course of a month, when it should be taken off, and a second placed in its stead, which, if the season is favourable, will be filled in less time than the first. I have known three or four successively taken off one stock in a season. Glasses can be used instead of straw caps, by those who are curious in observing the bees at work ; but they must be kept covered from the light and heat, except for a short time while looked at, which is best done when the sun does not shine upon the hives.

"Honey taken in this way is purer than when taken in any other way ; and if the small hives or glasses are filled and taken off, the honey will keep in the comb in those hives all the year, as good and perfect as the day it was taken from the bees,—for it will be wholly free from bee-bread or young brood, which are both very detrimental to the preservation of the honey.

"When you take off a small hive, run a knife between it and the large one, which will cut through any comb the bees may have worked through the hole. Set it on a plate or dish, and instantly set an empty one on the old hive. Then take your small hive to the distance of twenty or thirty yards from the other, and let it stand for half an hour, putting a cloth round it, so that the bees do not get out; but mind it is not so close as to smother them. Then turn it upside down, and place another hive upon it, wrapping a cloth round them, so that they cannot escape; then keep tapping repeatedly against the full hive, for five or ten minutes, in which time the greatest part of the bees will go up into the empty one; then take it and shake the bees out on to the ground, or on a cloth, near the hive you took them off; which process must be repeated till you have cleared the small hive of the bees. But if you took the small hive off, and set it so that the bees could get in and out freely, even in a darkened room half a mile distant, they would some of them fly home and give notice to the stock, who would very soon flock in great numbers to the small hive you had taken off, and (if let alone) carry the greatest part of the honey from the small hive back to the stock from whence you had taken it off."

"First swarms, when they have been hived fifteen or twenty days, if the weather is favourable, or when they begin to lay full at the mouth of the hive, put one of the small hives on, and that will generally be filled with pure honey in three or four weeks. Then take it off, and put on another. If the season is fine, this will also get filled; and when they have been taken off, there will be sufficient honey left in the lower or large hive for the stock to live on through the winter, and be equally as strong in the spring as if no honey had been taken from them. When the last hive or glass is taken off (which it should be, whether full or not, before the end of September), put a cork in, or a piece of board over the hole, and plaster it round with

lime or clay, to make it air-tight; cover the hive to keep out the wet, as well as the extremes of cold or heat."

To accomplish taking off a full cap, or a glass of honey-comb, in its perfect state, is thought by the amateur in bee-management a feat worthy of merit and imitation; and as this desirable object is effected by two or three different ways, I give here, in addition, the method successfully pursued for many years by Mr. Monkhouse, who is also particularly attentive to every minutiæ regarding apiarian pursuits.

TAKING OFF GLASSES, SMALL HIVES, OR CAPS FILLED WITH HONEY.

Premising that in all operations with bees, gentleness and absence of noise is to be particularly observed, so that the bees may not be alarmed, but rather taken by surprise: with a knife (glazier's pointed putty knife to be preferred) quietly loosen the glass or cap from the board or hive to which the bees have cemented it; and, finding it quite loose, having in your left hand an empty glass or cap, quickly take off the full glass or cap with your right hand, and place on the same spot the empty one, then briskly walk away with the full glass or cap, holding it in the same position (downwards), to a summer house or outhouse having a window, and place it on two sticks placed across a dish or pan, and there leave it, and close the door of the summer house or outhouse. In a short time the bees will begin to leave the glass or cap, and fly to the window, which should be provided with the convenience for your opening it on the outside. On observing bees at the window, open it, and let those out, and immediately close it; and so successively until all have left. When no more bees appear at the window, you will find the glass or cap empty of bees, or nearly so, and then remove the glass or cap to your house. Great care is to

be taken in not suffering the window to remain open, that no bees can return until you have removed the glass or cap; otherwise great confusion will arise by bees coming back in numbers for the purpose of emptying the glass or cap of honey. The glasses or caps, when filled with honey, may be taken off in the middle of a fine day, as they are then less crowded with bees, which are abroad. Take off the glasses or caps at least an hour before the light of the day begins to diminish, as the bees will not move from the glasses or caps after it begins to be dusk.

Take care you properly estimate the weight of the glass or cap, and that you have sufficient purchase to hold it securely by the top on removing it to the summer house or outhouse, where the sticks and pan or dish have been adjusted ready for its reception. Tying a bit of strong string to the knob of the glass or top of the cap will give you a much securer hold of the glass or cap than the knob, or, probably, the top of the cap could.

In the absence of the above conveniences, take off the full glass or cap of honey about an hour before it becomes dusk, and place it on its side, some distance from the hive, under an evergreen or shrub, or under growing vegetables. In a short time you will find the bees begin to leave; and all will have left before it becomes dark. Observe, patience is essential; and if you endeavour to hasten the departure of the bees by disturbing them, or shaking the glass or cap, you will alarm them more, and retard their moving, and probably loosen the combs. It will sometimes happen that brood may be in some part of the glass or cap, particularly if the glass or cap be of large size. If this should be so, most of the bees will not desert their broods but by compulsion, and you must then remove the glass or cap and put it into a cupboard until the morning, taking care that no other bees can get to it. Many will leave in the morning, and the rest must be made to leave by flipping them off with a twig as they appear on the edge of the

combs. Any person performing the above operation, or witnessing it, wishing to avoid a not improbable chance of getting stung, had better protect his hands with thick woollen gloves and his face with a veil.

C. J. MONKHOUSE.

THE STRAW HIVE WITH REVOLVING TOP.

In the year 1826, the Society of Arts awarded me their Ceres medal for the invention of this bee-hive. I have these hives now in continual use, and am not aware of any straw hive that offers so many advantages. By these revolving hives we can obtain the finest honey at the period of its principal gathering. Their construction obviates the necessity of smoking, or driving, or, in short, of using any but the most gentle means. I wish to impress this upon the mind of the apiarian; for, much as we may desire to control the bees, we should do it as gently as possible, and with judgment. I have found by experience that the most trivial alteration in the situation of the hives, or any disturbance of the internal arrangement at a critical time, (*i. e.*, during certain stages in the transformation of the brood,) will totally change, or even destroy the means they have of perpetuating their species. In one of my experiments I so disturbed the economy of the hive, that the queen laid eggs which produced only drones. A certain number of days is required by the bees to produce their young. This also depends in a great measure upon the temperature of the hive, as well as upon the attention the bees are able to give, (their first care is honey, the second the perpetuation of their species); therefore, if a sudden disturbance or alteration be made, it may possibly at this time interfere with the regularity of the process. The hive is simple in its construction, and easy in its management. It is now made to carry three bell-shaped glasses on the top, which will hold, when filled,

about 12 lbs. Some years back, I used four glasses to contain this weight. I have since discovered, that small glasses give the bees much trouble, and that a glass moderately large is more readily taken-to by them, and often filled with honey in less time than smaller ones.

The following are directions which should be attended to, premising that the hive is clean, smooth inside, and in every way adapted to receive the bees. To put a swarm into this hive, the bell glasses being away, turn the board at the top, so as to entirely close the holes in the board underneath ; then tighten the thumb-screw, and hive the swarm into it. When the bees are all settled, remove it to where it is permanently to remain, whether it be to a single stand in the garden or to a bee-house ; let it remain protected, but undisturbed, for eight or ten days ; then place the glasses on, one over each hole ; loosen the thumb-screw, and turn the upper board, so that the holes may correspond with those in the lower board ; the passages being free, the bees will now be admitted into the glasses, and will commence building combs for storing the honey. The glasses should be covered with the common hive, and then left for two or three days without being looked at. The glasses should be fixed firm to the board by means of plaster or pieces of paper pasted round them. The bees always do this on the inside with a kind of gum, which they use for this and other purposes. If the glasses shake and are insecure, the bees will not so readily take to them, and thereby a portion of the honey-gathering will be lost. It is easily ascertained when the glasses are full by the cells of the comb being sealed over ; and the bees will partially have left. When you wish to take away a full glass, it is not requisite to turn the board, but merely, with a knife, remove the plaster outside of the glass (if this is done the evening before the better), and then pass the knife underneath to loosen it from the board ; take the glass off, and set it on a plate, and immediately replace an empty glass

over the hole. This process can be repeated to any number of glasses during the whole season of honey-gathering.

The best time to remove glasses is when the sun does not shine upon the hives, or bee-house; but any time during daylight will do, so that the few bees that are in the bell-glasses have time to return to the hive. The second glasses will often be more speedily filled than the first, sometimes even in a few days. A stock of bees in full working vigour will collect about two pounds of honey each day, during favourable weather. I repeat here the season of the year, when it will be advisable to desist from working the bees in glasses or caps; otherwise the parent hive will become impoverished. It is not desirable, in most seasons, to take away honey in this manner after the 10th of August (unless in the neighbourhood of a heath, or other backward pasturage), because the remaining part of the season sometimes proves unfavourable, and the bees are thereby prevented from collecting and procuring a sufficiency of food for their winter support. Therefore, about this time, remove all glasses and caps, turn the board and fix the screw; thus the bees are made secure. During the first months, they are occupied in providing for the support of the hive, and also during that period when they are partially in a torpid and inactive state. Contracting the entrance to all hives should also be done in August. This greatly assists the bees in their endeavours to prevent the plunder of their stores by wasps and the bees of other hives; space just large enough to admit a single bee is now sufficient. Glasses that are at this time only partly filled with comb and honey, should be carefully put by, to be again placed over the holes of the hive at the end of the following April; or, should the bees require to be fed with honey or syrup, these partly filled glasses will be found very useful for this purpose. The end of April is the usual time to commence placing on bell-glasses or caps. The stock hives are at this period

full of combs, bees, and brood of all ages ; and, should the season be forward, and continue favourable, you may expect to have the glasses well filled with fine honey several times. Honey obtained by means of these glasses being fresh from the hive, will be of the finest quality, and perfectly free from bee-bread, or young bees. It will possess the flavour and fragrance of the flowers then in blossom ; will be clear, and far superior to that obtained from common hives. The revolving hive possesses another essential quality, which is this :—the honey may be taken at pleasure, without risk or injury, or having recourse to that painful process of partially killing the bees by fumigation, which is also found to deteriorate the quality of the honey. The management here directed does not prevent the bees from swarming ; the owner has therefore the means still at hand to increase the number of his stocks. The apiarian will by means of these hives be gratified at the sight of these indefatigable insects, toiling to

" Improve each shining hour ; "

he will also be able to satisfy the curious, as well as those in search of their more minute operations,

" How skilfully she builds her cell,"

while he will be himself enriched with the store of honey. These hives are also constructed to remove one glass without disuniting the combs of the others. This is effected by keeping the three holes within half the diameter ; but the hive is not then so sightly, and there is no real advantage obtained by it. During my long practice in the management of bees, and in the invention and constructing of bee-hives, I have not shown exclusive attention to the production of a pretty hive, or rather to a pretty-looking hive, to the sacrifice of utility ; for I have ever found the best hives to be those free from complicated machinery. In short, every hive ought to be simple in

construction, and easy of management. Hives with numerous glass windows, and gilt ornaments, look pretty indoors, but they very soon lose their usefulness. One window of glass, to enable a person to see that the bees are alive, and to show to him the state of the combs, is sufficient; and this one will require to be protected from damp and frosts during four of our winter months. More than one weakens the hive of its stability, and exposes the combs to the bad effects arising from the glass attracting humidity.

MILTON'S ROYAL ALFRED BEE-HIVE.

A short description of this hive will at once show its usefulness and efficiency. The name originates with the circumstance, that the first trial of placing the bees into the hive was August 6th, 1844, the day on which H.R.H. Prince Alfred was born.

This hive is most conveniently adapted to the purpose of taking the honey without destroying the bees, and is found suitable for the conservatory, the library, the boudoir, or any room where the sun's rays come during some portion of the day. Six bell-shaped glasses are placed upon the upper part of it, which, when filled with honey, will contain about eighteen pounds. An important feature in the construction of this hive is, that the bees can enter and ascend to any part of it with the greatest facility; and all refuse, as well as all dead bees, are prevented from accumulating either in the hive or on the board. It is exceedingly portable, and can be easily carried from room to room by merely taking the most simple precaution—that of closing the entrance; and then not a single bee can escape, nor a comb be misplaced. The construction of it is such, that the whole of the interior can be inspected at all times—even during the greatest activity of the bees—without risk or annoyance. The feeding can be effected in two ways, on the top, and in front; and all other bees are

excluded at the time. The possessor of this hive will be enabled to contemplate, with feelings of great interest and pleasure, the secret workings of the bees: he will see them build their combs, and prepare the waxen cells, in the several compartments of the hive, and deposit in them that treasure (the honey) which, at a future period, may be removed without having recourse to the barbarous practice of destroying these valuable insects.

The facilities for placing a swarm of bees into this hive are at once simple and clear. The six bell-glasses are to be removed, for the purpose of hiving the bees, and the openings, during this operation, covered. The hive may then be rubbed inside with sweet liquor, care being taken not to smear the glass windows (the back portion of the box is moveable). This being done, the bees may now be shaken into it, and placed on the cloth which is to shelter the hive from the sun's rays. *All* the entrances are to be left up, so that the bees can easily find their way in. Leave them in this state until the cool of the evening; at this time the bees will have formed themselves more into a mass, and not be spread over (as at first) every portion of the box. The back may now be replaced, and then the hive may be removed to its appointed place. All the entrances may be continued up for the first few days, in order that the bees may find ready access to every part of the hive; and at the expiration of eight days, the glasses may be placed on,—removing the temporary coverings one at a time, until the whole six are in their places. Leave them firm, and do not, for the first ten or twelve days, often look at them. If the weather is favourable for gathering honey, the six glasses will be filled in about twenty days, and subsequently a second six; and one instance has been known where twenty-one glasses were filled during a season. The mode of removal of full glasses has before been pointed out. This hive, like other box-hives, requires care and protection during the months

when bees are inactive. By the end of August, all glasses, whether full or empty, should be removed, and the openings closed, with the exception of one. Over this leave a bell-glass and a piece of perforated zinc. This will permit the escape of any humidity from the interior of the box. The vacant space on the top should be filled with straw, or any material calculated to protect the box and bees from the effects of damp, frost, and other changes to which our climate is subjected. I have for this purpose used bran; this produces the desired effect. At this time (August) the entrance to the hive is to be contracted, leaving room for one bee only to enter at a time.

THE LEAF HIVE OF HUBER.*

The Huber or leaf hive, which I now submit to the public, is much improved in its construction and capabilities. These are made partly from my own experience and practice. It now combines all that is deemed requisite for affording the apiarian opportunities of pursuing his researches, in order to discover the hitherto hidden secrets of this wonderful insect. All naturalists are justly proud of the indefatigable Huber. They regard him as the most accurate depicter of the domestic economy of the bee. He assisted to remove many vulgar errors; and his discoveries and statements have often been confirmed, and are at this time well established.

Nevertheless, are we to rest inactive, and to feel satisfied that Huber has accomplished all?—that his leaf hive is perfection? For my own part, I was determined to try further, in order to render it more practicable. The success, however, of my experiments for a long time was very slow. From the year 1826 to 1830, the chief com-

* His researches, directed to the instinct and operations of the Domestic Honey Bee, justly proclaimed him the Father of Apiarian Science.

plaint against leaf hives was that the bees did not work their combs parallel with the frames,—an object most important, and which must be accomplished. In order to effect this, I resolved to try the raised bars, forming salient angles. This did not much mend the matter. However, I am happy to say I have at last succeeded in overcoming the difficulty. The hive is now composed of eight vertical frames, the material of which is cedar of a suitable thickness. The frames are about ten inches in height, nine in depth, and one and a quarter in width, all inside measure. Each frame has a pair of shifting hinges; in the whole there are twenty-four pairs. We can thus open any particular leaf without meddling with the rest. The proportions are very exact, and in accordance with the habits of the bees. There is a glass window in each end frame, by means of which, and the facility of opening the frames, the interior of the hive may be completely inspected.

There is not much difficulty in placing a swarm into this hive. As a security for keeping the frames together, it will be as well to tie the whole round with a piece of cord previously to hiving the bees into it; and it may be rubbed inside (avoiding the glass) with a little honey. The hiver should hold the hive with his left arm and hand, with its under side upwards; then, with his right hand, gently shake the bees into it. They will fall amongst the bars, and he may immediately place it (one edge raised up a little) on a cloth, and partly cover it from the sun's rays, until the bees are all quietly settled. In due time he may deposit the hive in its appointed place. The other plan, of first hiving the swarm into the common straw hive, as directed for uniting swarms, can be also adopted with the Huber hive, by which means all chance of injury to the hive is avoided. In taking honey from this hive, the bee-master has the whole interior completely under his eye and at his disposal, and can choose what combs best suit his purpose; taking care, however, to do so only

at such periods as will leave the bees time to replenish what has been abstracted, before the season for gathering honey has terminated. This hive is also well adapted for artificial swarming. By separating the hive into two halves, the honey, brood-combs, and bees will, generally speaking, be equally divided; and by supplying each half with four empty frames, we shall have two hives,—half empty, it is true, but equal in number of bees, of brood, and even of stores. One of the now new hives will possess the queen; and if the operation has been performed at the proper time, the probability is there will be royal brood coming forward in the other; at all events, there will be plenty of eggs and larvæ of the proper age for forming an artificial queen.

This ingeniously constructed hive, if not quite perfect, will now be found to answer the main purposes of every other. "In your presence," says Huber, "I have opened all the divisions of the most populous hive, when the tranquillity of the bees has given you great surprise. When I observe that bees may be rendered tractable by the constant use of these hives, I conceive it need not be added, that I do not arrogate to myself the absurd pretence of taming them. I ascribe the delay of immediate revenge on opening the hives to the manner in which they are affected by the sudden admission of light into their dwellings. They appear rather to testify fear than anger."

THE BOX-HIVE, WITH INTERIOR BOXES.

This bee-hive is acknowledged, and justly, as one of the best for all practical purposes in keeping bees. The form externally is that of a square; but having blocks in the inside angles, it is made nearly to a hexagon. It is divided into two compartments by a board, prepared with four openings, upon which rest four boxes, for the bees to

work combs, and fill with honey, which, when filled, will contain about twelve pounds. One or all of these can easily be removed when required. Four bell-glasses can be substituted for these boxes, if thought desirable. This box-hive forms a complete dwelling for the bees, and the whole is under lock and key, which secures it from idle curiosity. It cannot fail to be admired for its novel appearance, and its simplicity of structure. I have been engaged several years in bringing them to the present state of complete efficiency; they are made of the best seasoned materials, and put together in the strongest manner. The greatest care and attention has been taken to render them capable of withstanding the action of the sun, wind, and rain; and now, with the assistance of a few feet of that inexpensive metal, zinc, this end may be said to be accomplished. The management of bees in this hive is similar to straw hives. The box is to be clean, free from any unpleasant smell. It may receive a gentle rubbing inside with honey, or not; but, in doing it, avoid smearing the glass window. In order to place a swarm at once into the hive, the four boxes are to be taken out, and the four holes stopped up. The bees may now be hived into it, and when all are in and settled, carry the hive to its appointed place. The same evening, or early the next morning, the holes can be unstopped, and all the four boxes (or glasses) put on over the holes; or this may be deferred for a few days if more convenient, but the sooner the bees are left quietly to pursue their various occupations the better. The boxes for surplus honey can readily be seen when full, by means of the glass window placed in each box. Their removal is to be effected, as before directed, with bell-glasses; and as fast as they are filled by the bees, may be taken, and others placed over the openings. I find zinc dividers very useful in the removal of these boxes: I use two, each being about six inches square, with one side turned up half an inch. After the small box has been loosened from the top by a

thin knife, push under one of the zinc plates with the half-inch turned downwards; upon this push in another zinc plate like the first, with its half-inch turned upwards. You may now carry the box, with one plate under it, where you please, and then take time. To put back an empty box or glass to be again filled, gently withdraw the zinc plate, keeping the box steady, but not pressing hard till you clear the opening; leave on the empty box. All this can be done without incurring the loss of a single bee. How to clear the box of the bees has been before directed.

BOX BEE-HIVES, USED AS STORIED HIVES.

Hives placed one upon another, for the purpose of keeping bees, are known as storied hives; they have been used and recommended by Wildman, Keys, Bevan, and others. Three boxes were considered a complete set. The modern practice is to use two only, and this number is quite sufficient for all purposes of utility; and provided these boxes are properly made, that good seasoned wood is used, and that the dimensions are suitable, *success*, in moderate seasons of honey-gathering, is tolerably certain. I make my boxes about a foot square, and eight inches deep; each box has seven moveable bars and frames; these obviate the necessity of guide-combs. The top board has openings for the purpose of permitting the bees to have access to both boxes. When one box only is in use, bell-glasses, or a straw cap, may be placed over the openings, for the bees to fill with honey. When the boxes are to be *storied*, it is best to place the empty box under the full one, taking care to stop the entrance above, so as to compel the bees to enter, and pass through the lower one, as old *stocks* are found to work downwards more readily than upwards. The boxes being made exactly equal, there is no difficulty in placing them properly for this purpose.

In order to work old stocks into a storied box, the best time for doing it is the day after the swarm has left; or if the object is the attempt to prevent the hive from swarming, endeavour to hit upon the day before you expect it, and at this period you will probably prevent the swarm from issuing. This will help the old stock by not lessening its numbers, and enable them to fill the under box with new combs. At the end of August, or early in September, the upper hive may be removed with its contents. (For directions, see "Large Quantities of Honey.") To begin a storied box, by placing a swarm into it, there is no more difficulty than performing the same operation with a common straw hive. The holes on the top are to be closed; and should it be intended to place glasses on the first season, it is necessary to let the swarm work in the box, for the first ten or twelve days, undisturbed; and after this time has expired, unstop the openings at top, and set the glasses or cap upon it, protected as all other glasses are, and in the usual way. At the commencement of the swarming season, I recommend that all hives, whether made of wood or straw, should be examined and prepared, that they may be in readiness when wanted. By preparation, I mean that by exposure to the air the material may become perfectly sweet, and free from every smell which is unpleasant to the bees.

All the hives I have hitherto described are single hives. This term is used to distinguish them from those boxes, or hives, that are used for working bees on the *collateral* plan. Single boxes are often placed close to each other for the convenience of space, and also that they may be easily protected. I have several so placed in cases; and these, being kept under lock and key, are secured from all depredation. Single-box hives are also made with ornamental stands, which when placed either on lawns, or among shrubs and flowers, have a pleasing appearance. I will describe

A SINGLE HIVE IN AN ORNAMENTAL CASE.

These hives are well calculated for the lawn or shrubbery ; they are purposely made to resist the action of the weather, and the bees do well in them through all the winter months, without more care than is usually bestowed on hives that are sheltered in a bee-house or shed.

The case is hexagonal ; the bee-hive two-thirds spherical, or globe-like : they are made to carry three glasses on the top, and the communication between the glasses and the main hive is, by a simple contrivance, easily stopped, by which means one glass, or the whole three, can be taken off with much readiness. The hive and case is fixed to a strong frame, and this is supported by iron feet, which when let into the ground secure the whole from every conceivable disaster. The other management of this hive is similar to all hives.

COLLATERAL BEE-BOXES.

To work bees collaterally, a set of three boxes is required, and these are to be arranged side by side ; the communication for the bees to move from one box into another is made in the side, or sides, where the boxes meet. All the boxes are made square ; the usual dimensions are from ten to twelve inches high, and nine or ten inches deep. There is an opening on the top of each box, for the purpose of ventilation. The centre box is called " the pavilion," and is not to be interfered with. (" Disturb not the pavilion.") The swarm of bees are first to be hived into this pavilion, and a bell-glass may be set over its centre opening, for the purpose of being filled with honey. It is by means of the *side* boxes that the adopter of the collateral system is to operate ; and by the use of the thermometer, and ventilation, he is to succeed in preventing the bees from swarming.

The inventor of this method of managing bees in collateral boxes was the Rev. Stephen White.* When he introduced this system of arranging his boxes, he did not claim either merit or reputation for preventing swarming; but, on the contrary, in the Introduction of Mr. White's Treatise on Bees we find the following exclamation:—"Bless me! why so much pains to hinder the increasing of my small stock? Behold my little emigrants, in spite of all our SWARM-PREVENTERS! Behold! I see a cloud of them overshadowing my garden." If honey, in large quantities, can only be obtained from these hives by preventing swarming, I fear much disappointment will ensue,—not because it is impossible to prevent it, but, in order to do it effectually, much skill is required, great nicety of management; and even this is not all, for we must have the *season* in our favour. I have seen boxes arranged collaterally, and every attention given to them by professed apiarians—persons who have devoted much time to this particular management. All of them have at this time (1851) abandoned the plan, and returned to keeping their bees in single hives. My reason for not advising this method of placing bee-boxes is not because the owner cannot obtain honey from the bees,—I am aware that persons have succeeded in so doing; my objection is to the arrangement, and also to the continual interference with the bees while they are pursuing their mysterious operations in the hive. To change the temperature, guided by thermometers, tubes, and a vast amount of bee-machinery, is wrong, and hurtful. It is likewise my firm conviction that the collateral arrangement of bee-boxes is contrary to the nature and habits of bees, and to all insects which live in families, under one female or head. The union of all is chiefly maintained by smell,

* Collateral Bee-Boxes, or a New, Easy, and Advantageous Method of managing Bees, by Stephen White, M.A., Rector of Holton, in Suffolk. 1756.

and by animal heat being diffused regularly to the whole. All single hives, as well as storied hives, permit of this union of animal heat. The entrances to all hives are made in the bottom (I only know of one exception); this admits the cold external air, which by aid of the bees is made to diffuse the heated or lighter air of the interior of the hive regularly over the whole,—combs, bees, and young brood. This cannot be so effectually done when it is attempted to make the heated air traverse horizontally, particularly as the side boxes are ordered to be kept at a cool temperature, and thus act as a repellant. If I am right in my theory (though I fear I shall fail properly to describe the action of air), this will account for the frequent failures with these hives in preventing bees swarming (these failures amount to four in ten). And from what I have observed after examining the bees in the boxes collaterally arranged, I believe the swarms are more generally retained in the side boxes, where the bees are allowed, by those inhabiting the next portion, to carry forward comb-building, &c., under the queen that should have gone out with the swarm. The side box is occupied and used in every respect like the centre box; and each family enters at the one opening, apparently united as one stock. It may be asked, How is this to be ascertained? I will here endeavour to account for my opinion, and what has directed me to come to this conclusion. It was frequently represented to me that the bees in collateral boxes were known to fight and kill each other, in autumn; this led me to examine the boxes of comb, which I did, and in most instances I discovered there was very little honey or bee-bread; in some cases not any honey at all. In many I observed royal cells on the edges of the combs; some had been used, others only partly prepared; also, that when the centre box was heavy, the side boxes were light. By this I concluded that all had gone on peacefully until the stores of honey were exhausted in one, and then,

when the pauper family claimed a share with its neighbour, the strongest (as is usual) immediately defended their rights, and the consequence was a surrender or death. I offer a word also upon the honey obtained from ventilated hives and ventilated glasses, in the hope of calling attention to the subject. I have observed the honey thus obtained, however fine in appearance, was to the taste vapid; or, possibly, to use a bad comparison, like a thin, *dry wine*, as it is termed, when compared with one *fruity*, or more luscious. So, I think, is the difference with this honey, when compared with that obtained without ventilation. Another point I have noticed in keeping honey that has been acted upon by ventilation is, it sooner becomes candied. I therefore ask, does honey, after it has been collected by bees, and stored by them in cells, require heat to absorb a portion of the more watery particles? If it does, allowing the heat to escape at this time will account for the difference.

CANADIAN BEE-HOUSE.

(WITH HIVES ARRANGED.)

By this arrangement of bee-hives, the curious in bee management may be gratified at seeing immense numbers of bees in one hive; also large ranges of combs, containing a great weight of honey. I was favoured with an opportunity to inspect one or two of these houses, at the residence of a gentleman who had lived many years in Canada. I was certainly much astonished. I had heard, and also read of, combs measuring three and four feet, and weighing eighty to a hundred pounds weight; and I here saw in England, combs full twenty-four inches long, and twenty-eight inches deep, looking beautifully clear and white, with the honey glistening in the cells, and others containing it sealed over.

At a later period I inquired about this extraordinary

produce, and heard that several of the principal combs, containing fine honey, had been taken. Two of them weighed about thirty pounds.

The gentleman and his friend accompanied me to the bee-house, and requested that I would examine and make my own observations. They approached very cautiously, being aware that large numbers of bees were in the bee-house. As I intend to give what, I trust, will be an interesting description of these houses, before I proceed I will state what I saw. On opening the door at the back of one compartment of the house, a space sufficient to contain a man presented itself. I shut the door again, and then covered my face with a silk handkerchief, as I felt a desire to examine more closely. I again opened the door, and made a step into the hive, when I beheld ranges of combs suspended, and reaching half way to the bottom. In this compartment there were nine ranges, the interstices were filled up with bees ; but there were some through which I could perceive how these combs were attached, and also the arrangement of the whole interior. I need scarcely observe, not much time was permitted me to make the inspection ; but I gained courage, and should not fear another survey. I was informed that bees arranged for working in this way did not throw off swarms. This would certainly greatly facilitate their amassing such large collections of both combs and honey. I ascertained, however, that the bees in these houses did swarm ; that the large space did not effectually prevent their doing so. The Rev. B. Nicol, the gentleman I am indebted to for the introduction to this mode of constructing a bee-house, and the arrangement of the hives, has one or two of these houses. He favoured me with the following curious account of a swarm of bees, which forced their way into a compartment of one of his bee-houses, although it was previously occupied :—

" A good swarm of bees came off from one of my hives

and settled on the outside of the house, containing a hive very strong in numbers, and working on the Canada arrangement. They clustered all round the entrance, so that access was almost impossible. The swarm was carefully swept off into a hive ready for them; but they quickly left it, and in a short time were all found clustered at the bottom of the combs of the Canada hive. No doubt the queen had gone into that hive where first the swarm settled on the entrance to the house. They continued attached in a thickness to the bars on which the Canada hive stands, *without any bottom board*, and appeared to have left no opportunity for the bees belonging to the hive to get up into their combs. There they are all quiet, and working as if quite established.—May 27th, 1848."

I do not intend to notice the bee-hives of ancient bee-masters, some of which were, no doubt, clever contrivances, and possibly answered all the expectations held out by their inventors; and while, in the present day, we see hives totally inapplicable to the improved management of the bees, I think it would be superfluous to refer to all, however concisely, lest it should perplex the reader. I will, therefore, now recapitulate a few general remarks.

1st. I have already stated that the situation in which bees should be placed for working is not material as regards aspect, provided the hives have an hour's sun during some portion of a fine day. The most important part in the selection of the situation is, that the hives should be fixed in a *dry place*. I object to the *direct* influence of mid-day sun upon the hives, on account of the intolerable heat during the months of June, July, and part of August; the combs being then heavily laden with honey, the weight of which, even without this external heat, renders them liable to fall. The exposure to this great heat will also split bee-boxes in almost every case; in others it will warp them, to the great annoyance of the

bees, which are made more irritable, and therefore less agreeable to approach; whereas, if they are placed partly in the shade, they will molest no one. All hives should be constructed so as to admit the warm air contained in them to circulate freely, and be regularly diffused by the bees when in motion to every part of the hive; and when they are inactive, or in a partially torpid state, they should find sufficient space to cluster in a mass, or globe-like shape, which is the natural form they are led to adopt for sustaining their animal warmth.

Dr. Playfair, in a lecture delivered before the Royal Agricultural Society, observed:—"Warmth is an equivalent for food. This is illustrated by the fact, that two hives of bees do not consume so much honey when together as when separate, on account of the warmth being greater; and they have less occasion for consuming the honey, which is their fuel."

During the summer months, bees do not require any very particular attention, after the stock hives have thrown off their swarms, and have been properly placed; for they will do well in all ordinary seasons, if the weather be tolerably favourable. At this time, the owner has only to look after his share of the surplus produce of honey. Later in the year, about the end of August, he must contract the entrances to all his hives. This will assist the bees to guard and keep off the intrusion of wasps and robber-bees. I have a word to offer upon the subject of "bees robbing bees." Those who will take the trouble, at the end of August, and also in September, to observe closely the actions of those bees which place themselves at the entrance of the hive, for the purpose of keeping guard (an invariable practice with bees), will perceive a particular motion of the antennæ of the bees on guard, at the instant one alights on the board with the intent to enter. The *challenge is peculiar;* and, after a few times observing this, and by attention to the number of bees

that enter and leave, and lifting the hive and board to ascertain its weight, they will be able to form an opinion whether it is in a proper condition to carry forward the means for reproducing their species. I believe that bees know the condition of all the hives near their own. If any of them have an unhealthy queen, those are marked out for pillage.

Bees can only work wax from the 10th of April until the 10th of August.

A swarm from a swarm is called a virgin swarm. If, in the next year, this maiden swarm throw off a swarm later than June, it is a good practice to return it to the maiden stock; or the chances are you will lose both.

All stocks that have missed swarming for two successive years—and, more particularly, if they have lain out, and shewn other symptoms of swarming—are very hazardous to keep as stocks.

Stocks weak as to number die; and stocks light of honey die. Even if they survive the winter, in the early spring months there is but little chance of their doing well. But constantly giving them food, and keeping them warm, are means that may possibly save such stocks.

Swarming.—If a swarm has left the parent stock, and partly settles, but after a while returns to the hive again, be rather on your guard; and when it issues out again, quickly hive it, and cover it well up with a cloth, as there is danger of its flying off altogether. Should the weather, for some days after a new swarm is hived, continue unfavourable, so as to prevent the bees going out, they must be fed with syrup until it clears up, otherwise the young swarm will be liable to perish for want of food.

APIARY IN THE GREAT EXHIBITION.

Soon after the grand idea was announced by His Royal Highness Prince Albert, by the sublime words he used at the City Festival, as to his view of the effects likely to be produced by the gathering of the world's industry under one great canopy, it occurred to me that our only emblem of industry and unity is a hive of bees. This is in a great degree recently corroborated by the remark in the Times * of the 28th of April, 1851, in its report on the Great Exhibition. Amongst the various designs submitted to the Royal Commissioners for the building in Hyde Park, there was one to have a dome in the centre of it. I thought this, filled with bees at work, with their accustomed activity, would be an appropriate emblem. I have a glass globe, capable of containing about a million bees, which serves as a model sufficiently to show the mode of preparing it on a larger scale. I kept my mind engaged upon effecting this important object, and anxiously watched the proceedings of the Commissioners. As soon as Mr. Paxton's plan was decided upon, and the building in rapid progress, I applied for permission to exhibit bees. The transept of this building seemed to suggest to me the best site for constructing what I had long thought of—viz., a window apiary. I may not have selected the best design for so grand an occasion, but there was not sufficient time for preparing hives with bees at work,—for these insects and their waxen cities are unlike articles of manufacture, which can be proceeded with both by day and night. Time and season are indispensable in addition to skill and contrivance; otherwise, I could have prepared "a crystal palace," in miniature, for bees, in which could have been shown all their various and most interesting movements and industrial habits; but I

* "People move about the Great Exhibition like Bees in a hive, the cells of which they are engaged in constructing."

preferred exhibiting these three hives of my own invention as works of art, they being more practically useful than the miniature "crystal palace" would have been.

THE UNICOMB OBSERVATORY HIVE.

This hive is constructed for the purpose of observing minutely the operations of bees, and is, of course, only useful to the amateur apiarian, who is seeking for either information or amusement. Hives containing one comb only have been adopted by Bonnet, Huber, and other naturalists; some of which, from the description given of them by these writers, must have been very inconvenient for the purposes intended. Mr. Dunbar, with his observatory hive, constructed upon better principles than those I have just referred to, has been able to make some interesting observations on the economy of the bee, which were published in the third volume of the Edinburgh Philosophical Journal. Some years back, Mr. Dunbar paid me a visit, and I showed him one I had then made. He pronounced it as an improvement upon his own.

In the present day, the principal improvement in unicomb hives is chiefly obtained through the aid and skill of our mechanics. It is my good fortune to have in my employ one who cannot be easily surpassed; and I feel confident in asserting that the unicomb hive exhibited by me in the Great Exhibition is a masterpiece of hive-making. This hive affords every facility for making experiments and observing the proceedings of the bees, which, being prevented from constructing more than one comb, cannot conceal any part of their operations as in other hives, every bee being exposed to view. The queen may be followed in all her movements. In this hive it is easy to lay hold of her majesty at any time. The bees may be fed and retained prisoners. They may be also forced to make wax from honey only, honey from

sugar, &c.; in short, all the experiments that have ever been made may be verified by means of this hive, and new experiments tried.

In spite of its peculiar advantages, however, it has inconveniences which annoy the naturalist. The insects cannot cluster together in it, as they do in other hives, and concentrate the heat during winter; and hence they are liable to perish. The smallest variation of the atmosphere is injurious to the brood; but with all its present imperfections, I do not despair of being able to construct a unicomb or mirror hive, in which bees can be safely preserved through the winter. Having overcome one great obstacle,—namely, that which all apiarians have hitherto encountered in introducing a swarm into this hive,—I am sanguine enough to believe that I shall eventually succeed in preserving them through the winter. This hive, when filled with bees and comb, may be inspected at any time without disturbing the bees, and without the slightest danger of any one being annoyed by them. When the observer is satisfied with inspecting one side of the comb, he may turn the hive round and examine the other, without even changing his position.

I hope I have shown enough as a practical bee-keeper to create a taste not only for "window apiaries" in every suburban residence, but that the result of my experience, detailed in these pages, will induce all who take an interest in bees to become apiarians.

THE END.

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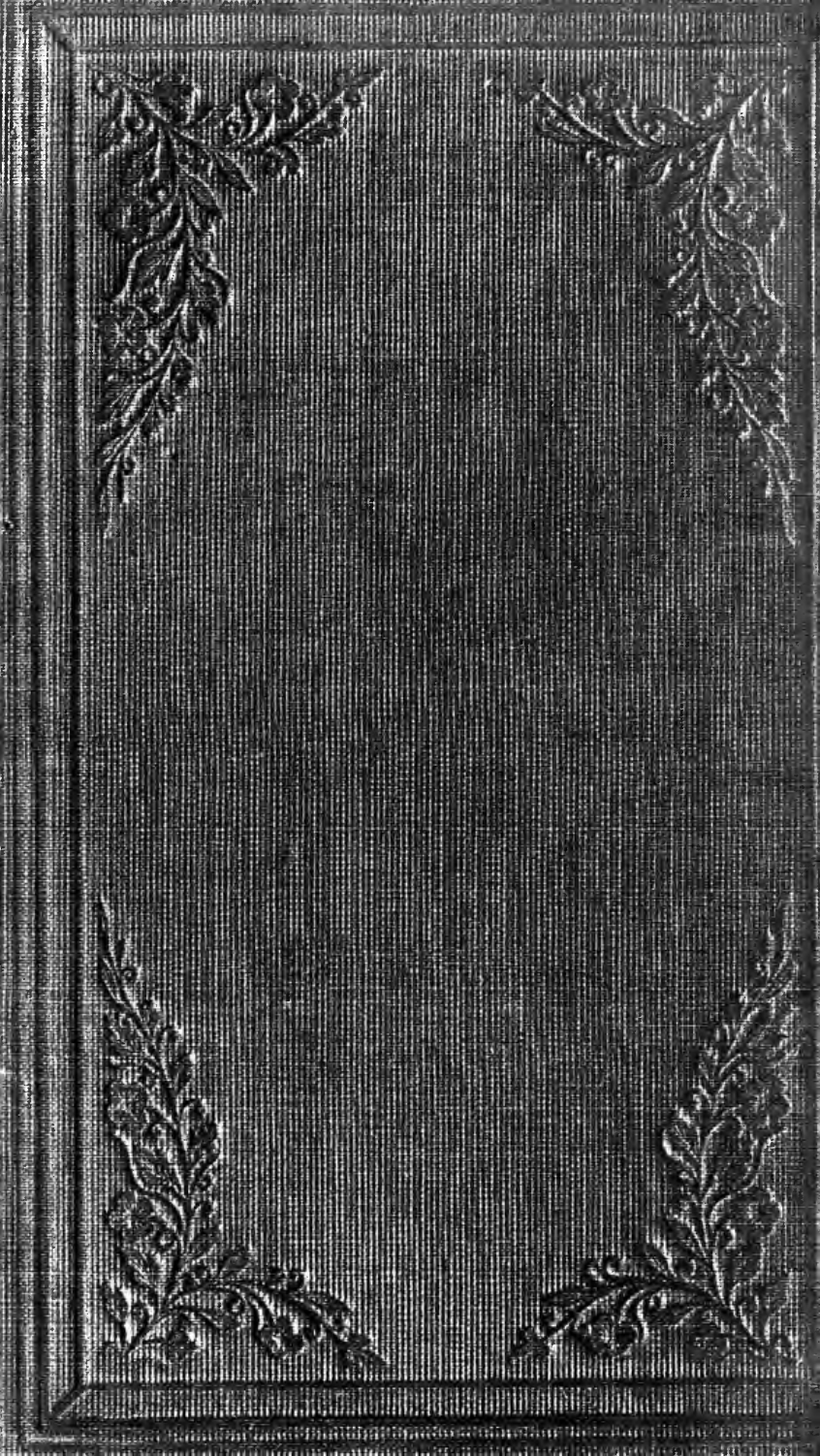

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